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CATALOGUE

(WITH AN APPENDIX)

OF



THE NAVAL MODELS

IN THE

SOUTH KENSINGTON MUSEUM.

PART I.—ADMIRALTY COLLECTION OF MODELS,
ETC.

PART II.—COLLECTION OF MODELS FROM PRIVATE
SOURCES.

APPENDIX AND INDEX.



LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

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The Secretary of the Science and Art Department will be glad to receive any communications in reference to corrections or additional information for insertion in the next Edition, addressed to him at the Naval Gallery, South Kensington Museum.

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SHORT INTRODUCTION

TO THE

GALLERY OF NAVAL MODELS.

THE great bulk of the models in this collection belongs to the Admiralty, and was removed in the summer of last year (1864) from Somerset House to South Kensington, where it has become, for the first time, easily accessible to the public.

This collection was commenced by Sir Robert Seppings, who was Surveyor of the Navy during some years in the beginning of the present century, and has been continued by his successors, Sir William Symonds, Sir Baldwin Walker, and Admiral Robinson, in a tolerably complete series. It is, however, to be remarked that few models of iron-cased vessels are to be found: not that such models do not exist, but being made for use in the department of the Controller of the Navy, and not for public exhibition, they cannot form part of a collection such as that which is exhibited in the Naval Gallery, removed from all possibility of constant daily reference by the Controller of the Navy and the officers of his department charged with the duty of designing new plans. A collection of Admiralty models alone, accessible to the public, can, therefore, from the nature of the case, consist of few but those of ships possessing rather an historical than an immediate interest. It is, doubtless, highly desirable that the collection should be enriched by models of our iron-clads and other modern vessels on which the public attention is fixed at the present time; and it is to be hoped that means may be found of gratifying the laudable curiosity of the public with regard to vessels of this class at no distant time. As an interest-

ing historical record, however, of the science of shipbuilding in the English Royal service down to comparatively recent times, this collection is invaluable.*

The first in order of time and historic interest is the "Henry Grace de Dieu," or "Harry Grace à Dieu," called here the "Great Harry," of which there are two models, one full in block of about $\frac{1}{4}$ -inch scale, and another on $\frac{1}{16}$ -inch scale, full-rigged. There has been considerable doubt as to the reign in which this vessel was built. Most writers have attributed its design to Henry VII.; but the papers in the Public Record Office which have been consulted by Mr. McHardy leave no room for doubt that she was built under Henry VIII., being laid down in August or September 1512, and launched in June 1514. There is some reason to think that the "Regent," which she was meant to replace, having been destroyed in an engagement with the French on 10th August 1512, which was undoubtedly built in the reign of Henry VII., was originally known as the "Great Harry," and received the name of the "Regent" on the accession of Henry VIII. It was probably with regard to this ship that Admiral Sir Edward Howard, (who made the successful attack on the French galleys at Brest in April 1513, which gave the English the command of the narrow seas during the subsequent years of the reign of Henry VIII., in which attack his impetuous bravery cost him his life,) thus expressed himself in a letter to his Sovereign: "Sir, your good ship is the flower, I trow, of all ships that ever sailed. Sir, she is the noblest ship of

* It may be interesting to know that this collection was originally preserved in a large room on the second story of Somerset House, in the centre of the south or main building, known as the model room; but on the removal of the Controller's Department from Somerset House to Whitehall, and the great expansion of the departments left at Somerset House, it was found that this room was needed for other purposes, and three years ago it was contemplated to break up this collection, and steps had been taken to disperse it, when, mainly through the zealous efforts of Mr. Coghlan McHardy, the private secretary of the Controller of the Navy, by whom very valuable services have been rendered in the classification of the models and the compilation of the Catalogue, a long room on the basement floor at Somerset House was prepared for the reception of the models, to which they were removed with the sanction of the Admiralty.

"sail is this great ship at this hour that I know in
"Christendom." (See *Photograph*.)

The "Great Harry" possesses historic interest as being nearly the first ship in a Royal Navy, properly so called, and certainly the first built with more than one mast. In previous times the Crown had been mainly dependent on the Cinque Ports for a supply of vessels as they were required for any emergency, and on merchant vessels impressed for the occasion, which reverted to their owners as soon as the special service for which they were required had been rendered.

After having been engaged in one action with the French off the Isle of Wight in 1545, the "Great Harry" was accidentally burnt at Woolwich in the year 1553. It is a very remarkable structure, and conveys a good idea of the requirements of ships of war at that period. The observer cannot fail to be struck with the small extent of the immersed portion of the hull compared with that out of water, and the enormous structures at the head and stern,—the fore-castle, aptly so called, and the poop, intended to harbour and protect large numbers of bowmen and arquebusiers, who played the most important part in naval engagements of those days, which were chiefly carried on hand to hand. The broadside guns were small and of light weight. With an armament similar to that of our modern ships, the "Great Harry" would have been absolutely dangerous. As it was, it must have been a matter of no slight peril to navigate her during high winds and through heavy seas, even in the Channel. To have crossed the ocean in her would have subjected the bold mariners who attempted it to almost certain shipwreck. It is instructive to observe in the series of models of later date how very gradually the dimensions of the fore-castle and poop were reduced to meet the exigencies of a heavier and more effective armament, and of ocean navigation. A strongly marked fore-castle and poop were characteristic of our ships until nearly the middle of the 18th century, while the practice of building large vessels with flush decks, as in the case of our iron-clads, has been introduced only within the last few years.

Henry VIII. has an undoubted right to the credit of being the founder of the Royal Navy as it has existed from his time to the present day. He settled its constitution, established an Admiralty and Navy office, and founded Portsmouth, Woolwich, and Deptford dockyards. *In the year 1546 the Royal Navy consisted of 58 ships of from 15 to 100 tons, with an aggregate burden of 12,455 tons, 783 gunners, and 8,546 men.

In the reigns of his two immediate successors, the disturbances arising from the change of religion and the exhaustion of the Treasury caused the Royal Navy to decline, no new ships probably being built to supply the natural decay of the old ones; thus in 1548 the Navy consisted of 53 vessels, with an aggregate of 11,268 tons and 7,731 men, and ten years later, in 1558, it was reduced to 27 vessels, with a total of 7,110 tons and 3,565 men. In the reign of Elizabeth the mariners of England again played an important part; but the greater part of the vessels which defeated the Spanish Armada, and established the supremacy of England at sea, were hired from the private trade to meet the emergency, and were restored to their owners on the final defeat of the Armada, and were engaged probably during the remainder of their existence in a traffic much resembling piracy, which completely broke the Spanish power at sea. The Spanish Armada consisted of 132 ships of 59,120 tons, carrying 3,165 guns and 30,621 men, which Elizabeth confronted with 197 ships of 29,744 tons, carrying 15,785 men. This was in 1588; in 1603, at the death of this Monarch, the Royal Navy consisted of 42 ships of 17,055 tons, and 8,346 men.

James I. is said to have taken a great interest in the Navy. He employed Mr. Phineas Pett, M.A., of Magdalen College, Cambridge, and subsequently Master of the Shipwrights' Company, as his Naval Architect, who built several ships for him, although at his death in 1625 the total

* See Chart of the Navy of Great Britain from the earliest period of history, compiled from Historical Publications, old Records, Parliamentary Returns, and other authorities, by F. Perigal, Esq., of the Admiralty Office, from which this and other returns are taken.

number of ships in the Navy had diminished to 33, while their tonnage had increased to 19,400.

Charles I. made great efforts to improve the Royal Navy; he divided it into rates or classes as it remains at the present time. He built several ships with the tax imposed arbitrarily, without the consent of Parliament, known as ship-money, the collection of which led to such notable results.

The "Sovereign of the Sea" or "Royal Sovereign," of 100 guns, and larger than any ship previously launched was built in 1635 by Mr. Peter Pett, the second of a generation of naval architects who were the chief constructors of the navy from the reign of James I. to that of William III., and is a considerable improvement on the "Great Harry." There is an interesting whole model of this ship in the collection, on a $\frac{1}{4}$ -inch scale. (See *Photograph*.)

During the Commonwealth the navy was well administered, and the Dutch were signally defeated in an action fought on the 31st July 1653, when 30 of their ships were lost, and their famous Admiral Van Tromp was taken.

In 1658 the navy consisted of 157 ships of 57,000 tons, 4,300 guns, and 21,910 men.

In the reigns of Charles II. and James II. great attention was paid to the navy, though its development was not as rapid or satisfactory as it would have been under a less corrupt administration of naval affairs. During the reigns of the succeeding Monarchs the navy has gradually increased; and there is a tolerably consecutive succession of models from the reign of William and Mary to the present time. It is impossible to particularize these; the reader will find a full description of them in the Catalogue.

Among those possessing an historic interest may be mentioned the "Victory," of 100 guns, built in 1735, lost in the Channel in 1744; and her successor, launched in 1765, the renowned flag-ship of Lord Nelson at Trafalgar in 1805, which still, as the flag-ship of the Commander-in-Chief at Portsmouth, perpetuates to successive generations the memory of that glorious era in our naval annals; the

"Royal William," built in 1682, and the "Royal George," launched in 1730, which went down at Spithead with Admiral Kempenfeldt and all her crew in 1782.

The models of the ships are arranged according to their rates, thus enabling the student to estimate the progress made in shipbuilding in this country from time to time. This was exceedingly slow up to the commencement of the present century. In 1719 the Navy Board, content with the performances of the vessels then in the Royal service, laid down a scale of dimensions and tonnage for vessels of each class—from the first-rate, carrying 100 guns, down to the gun-brig,—from which the constructor was not at liberty to depart. A vessel of the highest class was thus limited to about 2,000 tons burden, and no latitude was left for improvement or for adapting the ship's carrying power to increased weight of armament. Although, as a matter of fact, some deviations were admitted, especially in the attempts which even then were made to introduce the improved French types into our service, yet so little real progress was made that when in the middle of the century the master-shipwrights of the several dockyards were required to forward to the Navy Board proposals for an improved scale of dimensions and tonnage for the several classes of ships, the changes proposed were trifling, and in some cases were absolutely nil. Thus, the scale of 1719, with very insignificant alterations, remained in force until the peace of Amiens, when a greatly improved scale was established on the plan of the French navy, the vessels of that nation having proved their incontestable superiority during the revolutionary war. Even then, however, the fatal mistake of requiring a fixed tonnage for each class of ships was adhered to, and rendered nugatory the attempts at improvement made after the peace of 1815 to 1830, by building experimental ships to compete with each other. Sir William Symonds, who was appointed Surveyor of the Navy by Sir James Graham in 1831, was the first constructor who succeeded in freeing himself from these fatal shackles. The injurious result of these restrictions is plainly traceable in the sameness of the models during all this period. The

rule for determining the tonnage being based on purely arbitrary principles, leaving one of the dimensions—the depth—at the disposal of the constructor, led to the flaring bows, falling-in sternports, and full, deep bodies which so long characterized our ships, and rendered them bad sailers, and especially dangerous on a lee shore, from the great amount of leeway they made.

During this period the French had encouraged the application of scientific principles to shipbuilding with great comparative success, the French ships captured in war and taken into the service having uniformly proved to be far the best of their class.

The observer will not fail to trace the causes of the superiority in the models of the French ships in the collection—a superiority due to the absence of the restrictions so fatal to progress in England, leaving the French naval architect free to avail himself of all the resources of his art.

The models of English ships of war built since 1832, under the influence of more enlightened knowledge, will bear comparison with those of any nation.

The vessels of the last few years are at present almost unrepresented in this collection. The iron-clads, as already explained, are almost wholly absent. There is a model of the "Erebus," one of the original floating batteries built during the Russian war by Mr. Napier of Glasgow, after a French design; on the same lines the "Terror" and "Thunderbolt" were also built. There is the "Prince Consort," a wooden ship protected by iron-plates, designed by the present Controller's Department, built at Pembroke, and launched in 1862. The only representative of the iron ships protected by iron-plates is the "Northumberland," now building at Millwall. (See Photograph.)

There is also the "Prince Albert" shield ship, laid down at Messrs. Samuda's Yard, Blackwall, in 1862, launched in May 1864, designed to carry guns in revolving shields upon the plan of Captain Cowper Coles, R.N., on a similar principle to that of the Monitors so well known in the history of the Civil War lately raging in North America.

the curious observer will find a complete set illustrative of the block-making machinery invented by Sir Isambard Brunel* for the use of the Government early in the present century, and set up in Portsmouth Dockyard, where it has remained in use to the present day. This invention was rewarded liberally by the Government of the day, and was considered a masterpiece of skilful adaptation of machinery. Since that time the principles of machinery have become more extensively recognized, and successfully applied to most ingenious and important uses. No factory or workshop but abounds with such marvels of the ingenuity of man at the present day; but the name of Sir Isambard Brunel, as one of the more successful pioneers in this now well-trodden field, must ever stand pre-eminant.

It were endless to enter upon the details of the boats, spars, and other accessories of the armament and fitting-out of ships, which may be studied with advantage in the Naval Gallery at South Kensington, to which the public have now free access. Enough has been said to establish its national value. It were much to be desired that the modern modes of propulsion were as amply illustrated as the details of naval construction, and that models of marine steam-engines, screws and paddles, with the details of the several parts of each as adopted by various eminent makers and employed in the navy, were here exhibited. It may, perhaps, be not out of place to remind shipbuilders and engineers that the loan of models of vessels and engines, and their several details, will be thankfully received by the authorities of the South Kensington Museum.

The resources of our ship-building trade are illustrated by the great works which are now going on, not only for

* The merit of the invention of Sir Isambard Brunel is claimed for Messrs. Taylor, of Southampton, who, previously to the putting up of the block-making machinery in Portsmouth Dockyard, supplied the navy with blocks and sheaves. It is very possible that their machinery contained the germs of that which is now associated with the name of Sir Isambard Brunel. The improvements, however, and adaptation to steam power, were of so much importance in the eyes of the Admiralty of the time, that they rewarded Sir Isambard with a grant of 20,000*l*.

the British, but also for foreign Governments. Besides the "Northumberland," and other iron-clad building for the English Admiralty at the Thames and Millwall Iron Works, there are now building or just built, a frigate for the Turkish Government, to be called the "Sultan Mah-moud," of 4,222 tons, a Spanish frigate, of 4,862 tons, both iron-clad; by Messrs. Green a wooden frigate, plated by the Thames Iron Company, for the Spaniards; by Messrs. Napier, Glasgow, three Turkish frigates, the "Osman Aliy," "Orkhan," and "Abdul Aziz," of the same dimensions as the "Sultan Mah-moud;" by the Millwall Company two Turkish transports, the "Fuad" and "Imail," of 1,076 tons burden, a cupola ship for the Italian Government, of 2,306 tons; by Messrs. Samuda and Co. a cupola ship for the Italian Government, of 1,230 tons, a Turkish transport "Pertelo Neyalah," of the same dimensions as those at Millwall, a Peruvian frigate of 2,004 tons; by Messrs. Laird, Birkenhead, a wooden gun-boat of 420 tons, and an iron-plated ram, supposed to be intended for the Portuguese Government; by Messrs. Dodgson an iron twin-screw steamer of 173 tons, not iron-plated, for the Dutch Government.

The total number of vessels of all classes in the Royal Navy on 1st January 1865, including 85 screw gun-boats, was 735, of which 30 are iron-clads, built or building. The French iron-clads are 13, actually launched. Of the English iron-clads, 22 are launched, and the others are in a state of great forwardness.

The following list comprises the names of the iron-clads already built or nearly ready:—

Ship's Name	Tonnage	Horse-power	Length	Breadth	No. of Iron-plates (tons designed for)	Thickness of Armour	Thickness of Decking
			Ft.	Ft.		Inches.	Lozen.
Admiral	4,171	1,750	260	35	35	11	12
Black Prince	4,140	1,750	260	35	35	11	12
Warrior	4,140	1,750	260	35	35	11	12
Agamemnon	4,021	1,650	260	35	35	11	12
Minotaur	4,021	1,650	260	35	35	11	12
Northumberland	4,222	1,750	260	35	35	11	12
Reuter	4,000	1,650	260	35	35	11	12
Island	4,000	1,650	260	35	35	11	12

Ship's Name.	Tonnage.	Horse power.	Length.	Breadth.	No. of Projected Guns designed for.	Thickness of Armour.	Thickness of Backing.
Defence	3,700	600	250	54	16	1 in.	18 in.
Resistance	3,710	600	250	54	16	1 in.	18 in.
Calcutta	4,225	1,000	275	50	22	1 in.	Wood ship, side 2 in. thick.
Ocean	4,047	1,000	275	50	20	1 in.	Do to 184.
Prince Consort	4,841	1,000	275	54	22	1 in.	Do to 184.
Royal Alfred	5,005	800	275	54	22	6 and 1 in.	Do to 184.
Royal Oak	4,866	800	275	50	22	1 in.	Do to 184.
Lord Clyde	4,607	1,000	290	50	24	1 in. and 6 in.	Do to 184.
Lord Warden	4,607	1,000	290	50	24	1 in. and 6 in.	Do to 184.
Zealous	3,714	800	250	50	16	1 in.	Do to 184.
Bellerophon	4,234	1,000	280	50	22	1 in.	Do to 184.
Pallas	4,072	600	250	50	5	1 in.	Wood ship, side 2 in. thick.
Favourite	2,004	400	225	47	6	1 in.	Do to 184.
Romance	1,854	200	200	38	4	1 in.	Do to 184.
Enterprise	1,800	180	180	38	4	1 in.	Do to 184.
Viper	707	100	100	23	2	1 in.	Do to 184.
Vixen	794	100	100	23	2	1 in.	Do to 184.
Waterwitch	777	100	100	23	2	1 in.	Do to 184.
Prince Albert	2,520	500	210	45	6	1 in.	Do to 184.
Royal Sovereign	3,700	600	250	54	16	1 in.	Wood ship, side 2 in. thick.
Scorpion	1,807	200	220	41	4	1 in. and 1 in.	Do to 184.
Wivern	1,807	200	220	41	4	1 in. and 1 in.	Do to 184.

* Models of many of these ships will shortly be placed in the gallery.

The following short historical sketch of the Navy Office, extracted chiefly from the 5th Report of the Commissioners of Inquiry, dated 14th February 1788, (page 25) contains some very interesting information:—

"The records of the office do not furnish us with any information further back than July 1650, but we understand that the first establishment of a Royal Navy office was in the reign of King Henry VIII., who appointed certain officers, under the title of principal officers of his navy, to manage the civil branches thereof, under the Lord High Admiral; but these officers had no positive instructions for their guidance in the execution of their duty until the reign of Edward VI., when certain ordinances were issued for the conduct of the officers entrusted with the management of the marine affairs, which ordinances form the basis of all later instructions given for the conduct of the officers to whom the management of the civil branches

of the Navy were consulted. The officers at that time appointed to this duty were the Vice-Admiral of the Fleet, the Master of the Ordnance, the Surveyor of Marine Causes, the Treasurer, the Controller, the General Surveyor of the Victualling, the Clerk of the Ships, and the Clerk of the Stores, who were directed to meet once a week at the office on Tower Hill, to consult together for the good order of the Navy, and to report their proceedings once a month to the High Admiral: particular duties were also assigned to each member.

"The affairs of the Navy appear to have continued under the management of such officers until the time of King James I., who, in the sixteenth year of his reign, issued a commission under the great seal to Sir Thomas Smith and others, to inquire into the frauds and abuses which had been committed in the Navy, with power to remedy the same, and to manage, settle, and put the officers of the Navy into a right course. This commission was determined upon the demise of King James I. in 1625, when his successor, King Charles I., issued a new commission to the same persons. By this commission the offices of the controller and surveyor were suspended during its continuance, and the same continued in force until the year 1628, when it was made void by a new commission, restoring the management of the affairs of the Navy to the ancient principal officers established in the reign of King Edward VI.; but between this time and the breaking out of the Civil War several commissions appear to have been issued for regulating and settling the affairs of the Navy, during the continuance of which the functions of the original principal officers were always suspended.

"Upon the restoration of King Charles II. his Majesty constituted a Navy Board, by commission under the great seal, consisting of the Treasurer, Controller, Surveyor, and Clerk of the Navy, who were styled principal officers, to whom, on the 4th July 1660, three commissioners were added, to assist the said principal officers in the management of the affairs of the Navy.

"In January 1661 the Duke of York (then Lord High

Admiral) established certain instructions now in use (1778) for the conduct of the four principal officers; the other three being commissioners at large, had no particular line of duty allotted to them until the year 1666, when one of them was directed to take upon him so much of the controller's duty as related to the examination and control of the treasurer's accounts; another that part which related to victualling accounts; and in the year 1671, the third commissioner had that part of the controller's duty which related to the examination and control of the storekeeper's accounts, assigned to him, which, with the addition of one commissioner at large, is the present (1788) arrangement of the Navy Board."

In consequence of the great increase of the Navy, these arrangements were found incomplete and insufficient to insure the strict investigation and examination of accounts, the direction and proper conduct of correspondence, and supervision of stores; instead of the commissioners presiding over separate departments, committees were formed, and the business divided so as to admit of competent officers in each branch, possessing time and opportunity, to examine, digest, and conduct the parts allotted to them. Under this idea, by Order in Council of 8th June 1796, the Navy Board was divided into the three following committees:—

A Committee of Correspondence.

A Committee of Accounts.

A Committee of Stores.

The controller to belong to and preside at every committee.

The designing, building, and repair of ships was in the hands of the surveyors, of whom at one time there were three, and generally two, under the presidency of the controller.

In the year 1796 the Board consisted of the following members, viz.; Sir Andrew Snape Hamond, Bart., Controller; Charles Hope, Esq., Deputy Controller; Sir John Henslow and Sir W. Rule, Surveyors; George Marsh, Esq., George Rogers, Esq., William Palmer, Esq., Sir William Bellingham, Bart., Harry Harwood, Esq., and Samuel Gambier, Esq.

The office of Deputy Controller was abolished in the year 1816. In the following year the Transport Board, created in 1793, was broken up, and a Transport Committee was formed at the Navy Board.

A surveyor was refused in 1822, and a civil commissioner in the same year, leaving at the Board the following persons, viz: one Comptroller, two Surveyors, three Naval Officers, and three Civil Commissioners, in the whole nine, and thus employed:—Two at the Committee of Correspondence, two at the Committee of Accounts, two at the Committee of Stores, two at the Committee of Transport, with the controller at the head of each.

In 1832, during the presidency of Sir James Graham at the Board of Admiralty, the Navy Board was abolished, the civil affairs of the Navy being for the future conducted by the principal officers, under the direct control of the Board of Admiralty. At that time the department charged with the design and construction of ships consisted of a Surveyor (a naval officer) and two Assistant Surveyors. In 1857 this department was placed under a Controller (a naval officer), one Chief Constructor, and one Constructor, to which staff an Assistant Constructor was added in 1861. In 1864, by Order in Council, the constitution of the office was altered to a Controller, a Chief Constructor, and three Assistant Constructors.

The several Royal Dockyards were established as under:—

- Deptford - - Early in the reign of Henry VIII.
- Woolwich - - Called by Canales the Mother Dockyard, in the reign of Henry VIII., about 1509.
- Chatham - - In the reign of Queen Elizabeth on the site of the present gun wharf; removed to the present site about the year 1622.
- Sheerness - - Established in the reign of Charles II., about 1661. The present dockyard and basins were completed about the year 1823.
- Portsmouth - - In the reign of Henry VIII. In 1666, a dry dock and the Commissioner's house were built; and in 1848 the steam factory and steam basin were formed.

- Plymouth - - Prior to 1681, the Master Shipwright and workmen were borne on board of a ship fitted for their reception; and in 1683, in the reign of William and Mary, the dockyard was completed. In the year 1824, the name was changed from Plymouth Dock to Devonport.
- Milford - - A temporary yard, prior to 1815, at which time it was removed to Pater Hall's Point, and is now known as Pembroke Dockyard.

The following lists of the Lord High Admirals and First Lords of the Admiralty, and of the Surveyors of the Navy, are interesting in an historical point of view:—

6 June	1660	- James Duke of York	Lord High Admiral.
14 June	1673	- King Charles II.	First Lord of the Admiralty.
9 July	1673	- Prince Rupert	"
14 May	1679	- Sir Henry Capell, Knt.	"
14 Feb.	1680	- Daniel Finch, Esq.	"
20 Jan.	1681	- Daniel Lord Finch	"
17 April	1684	- Daniel Earl of Nottingham	"
8 March	1689	- King James II.	"
8 March	1689	- Arthur Herbert, Esq.	"
20 Jan.	1690	- Thomas Earl of Pembroke	"
10 March	1692	- Charles Lord Cornwallis	"
15 April	1693	- Arthur Viscount Palliser	"
2 May	1694	- Edward Russell, Esq.	"
3 June	1697	- Edward Earl of Orford	"
21 May	1699	- John Earl of Bridgewater	"
4 April	1701	- Thomas Earl of Pembroke	"
26 Jan.	1702	- Thos. Earl of Pembroke	Lord High Admiral.
20 May	1702	- Prince George of Denmark	"
28 June	1707	- Prince George of Denmark (on the union with Scotland).	"
29 Oct.	1708	- Her Majesty Queen Anne	"
29 Nov.	1708	- Thos. Earl of Pembroke	"
9 Nov.	1709	- Edward Earl of Orford	First Lord of the Admiralty.
4 Oct.	1710	- Sir John Leake, Knt.	"
30 Sept.	1712	- Thomas Earl of Strafford	"
14 Oct.	1714	- Edward Earl of Orford	"
19 March	1717	- James Earl of Berkeley	"
2 Aug.	1729	- Lord Viscount Torrington	"
21 June	1733	- Sir Charles Wager, Knt.	"
19 March	1742	- Daniel Earl of Winchelsea	"

27 Dec.	1744	- John Duke of Bedford	First Lord of the Admiralty.
16 Feb.	1748	- John Earl of Sandwich	"
22 June	1751	- George Lord Anson	"
17 Nov.	1756	- Richard Earl Temple	"
6 April	1757	- Daniel Earl of Winchelsea	"
2 July	1757	- George Lord Anson	"
17 June	1762	- George D. Earl of Halifax	"
18 Oct.	1762	- George Grenville, Esq.	"
20 April	1763	- John Earl of Sandwich	"
16 Sept.	1763	- John Earl of Egmont	"
12 Sept.	1766	- Sir Charles Saunders, K.B.	"
11 Dec.	1766	- Sir Edward Hawke, K.B.	"
12 Jan.	1771	- John Earl of Sandwich	"
1 April	1781	- Hon. Augustus Keppel	"
18 July	1782	- Augustus Viscount Keppel	"
20 Jan.	1783	- Richard Viscount Howe	"
10 April	1783	- Augustus Viscount Keppel	"
21 Dec.	1783	- Richard Viscount Howe	"
16 July	1788	- John Earl of Chatham	"
19 Dec.	1794	- George Earl Spencer	"
19 Feb.	1801	- John Earl St. Vincent, K.B.	"
12 May	1804	- Henry Viscount Melville	"
2 May	1805	- Charles Lord Barham	"
10 Feb.	1806	- Charles Grey, Esq.	"
29 Sept.	1807	- Henry Lord Malgrave	"
24 Nov.	1809	- Right Hon. Charles Yorke	"
25 March	1812	- Right Hon. Robert Viscount Melville.	"
2 May	1827	- His Royal Highness the Lord High Admiral. Duke of Clarence.	
19 Sept.	1828	- Right Hon. Viscount Melville.	First Lord of the Admiralty.
25 Nov.	1830	- Right Hon. Sir James R. G. Graham, Bart.	"
11 June	1834	- Right Hon. Lord Auckland	"
23 Dec.	1834	- Thomas Philip Earl de Grey	"
25 April	1835	- Right Hon. G. Lord Auckland	"
19 Sept.	1835	- Gilbert Earl of Minio, G.C.B.	"
8 Sept.	1841	- Thomas Earl of Haddington	"
13 Jan.	1846	- Right Honourable the Earl of Ellenborough, G.C.B.	"
13 July	1846	- Right Hon. G. Earl of Auckland, G.C.B.	"

18 Jan.	1849	- Right Hon. Sir F. T. Baring, First Lord of the Admiralty.
Feb.	1852	- His Grace the Duke of Northumberland
Dec.	1852	- Right Hon. Sir James Graham
	1858	- Right Hon. Sir John S. Pakington, Bart.
	1859	- His Grace the Duke of Somerset

Surveyors of the Navy :—

Name.	Commences.	Ends.	Remarks.
Sir John Tippets	- 30 Sept. 1668	- 24 June 1692	- Died.
Edward Dummer, Esq.	- 25 June 1692	- 25 Dec. 1698	
Daniel Furyer, Esq.	- 22 Sept. 1699	- 17 March 1715	- Died.
William Lee, Esq.	- 9 Sept. 1706	- May 1713	- { Then to Ports-mouth. } Two at one time.
Sir Jacob Ackworth	- 30 Mar. 1715	- 16 March 1749	- Died.
Sir Joseph Allin	- 16 June 1746	- 5 Aug. 1755	- Superannuated.
Sir Thomas Slade	- 6 Aug. 1755	- 22 Feb. 1771	- Died.
William Bateley, Esq.	- 6 Aug. 1755	- 24 June 1765	- Superannuated.
Sir John Williams	- 22 June 1765	- 12 Dec. 1784	- Superannuated.
Edward Hunt, Esq.	- 19 Mar. 1778	- 7 Dec. 1786	- Died.
Sir John Henslow	- 24 Nov. 1784	- 24 June 1806	- Superannuated.
Sir William Rule	- 26 Jan. 1793	- 21 June 1813	- Do.
Henry Peake, Esq.	- 7 June 1806	- 25 Feb. 1822	- Do.
Joseph Tucker, Esq.	- 26 May 1813	- 1 Mar. 1831	- Do. } Three at one time.
Sir Robert Seppings	- 26 May 1813	- 9 June 1832	- Do. }
Sir William Symonds	- 9 June 1832	- 30 Sept. 1847	
Sir Baldwin Walker, K.C.B.	1 Feb. 1848	- 23 Jan. 1860	

(The title of Surveyor was then changed to "Controller.")

Controllers :—

Sir Baldwin Walker, K.C.B. 23 Jan. 1860 to Feb. 1861.
Rear-Adm. Robinson, Feb. 1861

Chief Constructors :—

Isaac Watts, Esq., C.B.	- 1857	- 1863	- Superannuated.
E. J. Reed, Esq.	- 1863		

PART I.

CLASSIFICATION OF THE ADMIRALTY COLLECTION OF MODELS, &c.

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2nd. „ „ „ 2 „
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4th. Sloops, brigs, &c.
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- N.—Beams and mode of connecting the same to the ship's side. Page 140.
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CATALOGUE.

CLASS I.

Models representing the Lines and Forms of Ships of the Royal Navy, from its Commencement to the present Time, arranged according to their Dates and Classes.

DIVISION A.—WHOLE MODELS of SHIPS arranged as follows, viz. :—

1st. Line-of-battle ships of 3 decks.	5th. Yachts.
2nd. " " " 2 "	6th. Shot-proof ships.
3rd. Frigates.	7th. Miscellaneous.
4th. Sloops, brigs, &c.	

DIVISION B.—HALF MODELS of SHIPS arranged as in Division A.

DIVISION C.—MODELS of BOWS of SHIPS arranged as in Division A.

DIVISION D.—MODELS of MIDSHIP SECTIONS of SHIPS arranged as in Division A.

DIVISION E.—MODELS of STERNS of SHIPS arranged as in Division A.

CLASS I.

DIVISION A.—Whole Models, representing the Lines and Forms of Ships of the Royal Navy, from its Commencement to the present Time, arranged according to their Dates and Classes.

LINE-OF-BATTLE SHIPS OF THREE DECKS.

1. A MODEL (on about a $\frac{1}{16}$ in. scale), full-rigged, of the "HENRY GRACE DE DIEU," or "HARRY GRACE À DIEU," also called the "GREAT HARRY." This ship was built by Henry VIII. to replace the "REGENT,"* which was de-

* See Holinshed, vol. 3, p. 815 ; Burchett's Naval History, p. 337 ; Turner's History of England, vol. 9, p. 111 ; Stowe's Chronicle, p. 491.

stroyed in an engagement with the French on the 10th August 1512. She was, therefore, probably laid down about August or September 1512, and she appears to have been launched on 13th June 1514.* She was not, however, ready for sea till the following year.† The Master Shipwright who built her, and who was probably the first Master Shipwright of the Royal Navy, was named William Bounde.‡ A minute account of the expenses incurred in building her is preserved in the Record Office, Chancery Lane. A learned account of this ship by John Topham, Esq., F.R.S., is to be found in the *Archæologia*, vol. vi., pp. 183-4, 202-9, 216. Her dimensions, however, are not stated by any authority. All agree, however, that she was 1,000 tons burthen, and carried 700 men, viz.: 349 soldiers, 301 marines, and 50 gunners. The number of guns varied at different times. Several accounts make them 122 in number, 19 brass and 103 iron, but most of them were very small, only 13 of them being,§ according to one authority, 9-prs. or upwards. According to Charnock, 34 of them might be termed cannon in the modern acceptation of the term. As will be seen from this model, the ship carried four masts and a bowsprit, all square rigged. No English ship before Henry VIII.'s reign is known to have carried more than one mast.|| The only action in which we know of her being engaged was that off the Isle of Wight with a French fleet of 150 ships in 1545,¶ in which the "MARY ROSE," the next largest ship, was sunk accidentally, through her ports being too near the water, there being a distance of only 16 inches according to Sir W. Raleigh.** The French historian, Father Daniel, says the "'GREAT HENRY,' on board of which the Admiral had "hoisted his flag, was so battered, that she would likewise "have been lost had not the English towed her away," but this is probably an exaggeration. An ancient picture

* See Letters and Papers, Hen. VIII., pp. 1464-5, Record Office, Chancery Lane. "Offering at the hallowing of the king's great ship called Henry Grace "à Dieu, at Erith, 13 June, 6 Hen. VIII., 6s. 8d."

† Penny Cyclopædia, xxi. p. 387; Charnock's Marine Architecture, ii., pp. 43-4, &c.

‡ Idem. "William Bounde, making the king's great ship and 4 new galleys "at Woolwich, 600*l.* 1513."

§ Penny Cycl., vol. xxi., p. 387. A list of all her armament and ammunition is given in Appendix III., vol. vi., p. 216 of *Archæologia*, taken from a MS. in the Pepysian Library in Magdalen College, Camb. This account makes 21 brass and 130 iron guns, besides 100 hand guns. See also Charnock's Marine Architecture, pp. 28-9 and 51.

|| *Archæologia*, vol. iii., p. 266.

¶ Burchett's Naval History; also S. Lediard's Naval History, i., p. 105.

** Charnock's Marine Architecture, ii., p. 52.

of this fight is preserved at Cowdry, and a description of it may be found in vol. iii. of *Archæologia*: she was burnt accidentally at Woolwich on 27th August 1553.* Many modern writers† assert that Henry VII. built a ship called the "GREAT HARRY" in 1488, and their authority for this would appear to be a remark in Stow's *Annals*, p. 485, where he says that Henry VII. built his chapel in Westminster Abbey and a ship called the "GREAT HARRIE," in the same year 1503, and that each of them cost him 15,000*l.*; but no original authority has been found for this assertion. Yonge says that the "REGENT" and the "GREAT HARRY" of Henry VII.'s time are the same ship. Others say the "REGENT" was built by Henry VIII. But the fact appears to be that, though several kings of England possessed a few ships of their own, none built any before Henry VIII., unless the "GREAT HARRY" of Henry VII.'s time be an exception. The Cinque Ports were bound by their charters to furnish ships when required to do so for the public service, and when enough could not be obtained by this means, others were impressed at the different ports, or hired either in England,‡ or from the Genoese, Venetians, or Hans Towns. Henry VIII. may, therefore, be fairly considered to be the founder of the Royal Navy. He established the Dockyards of Deptford, Woolwich, and Portsmouth, appointed Commissioners of the Navy, and a Navy Office, and by the end of his reign had raised a navy of 58 ships, with a total of 12,455 tons.§

2. A MODEL (on about a $\frac{1}{4}$ in. scale) of the same ship as the preceding.

3. The "SOVRAIGNE OF THE SEAS," or "ROYAL SOVEREIGN," 100 guns, (on a $\frac{1}{4}$ in. scale), length 167 ft. 9 in., breadth 48 ft. 4 in., depth 19 ft. 4 in., tonnage 1,683. Built at Woolwich Yard in 1637, burnt at Chatham in 1695, in consequence of a candle having been accidentally left in the cook's cabin. Designed by Captain Pett, sen.

Her tonnage has been variously stated (see James's *Naval History*), but the particulars above quoted are as

* *Archæologia*, vi., 209.

† Yonge, i., p. 19; Allen, i., p. 21; Penny Cycl., xxi., p. 387; Ency. Metr., iv., p. 329. See also Pict. Hist. of Eng., ii., p. 780; Anderson's History of Commerce, vol. ii., pp. 23-5; and Charnock's Marine Architecture, ii., pp. 28, &c.

‡ Charnock's Marine Architecture, ii. p. 31.

§ James's Naval History, i. p. 400.

stated in an official list, now in the Department of the Controller of the Navy. This vessel was originally named the "SOVERAIGNE OF THE SEAS," but subsequently "SOVEREIGN," and then "ROYAL SOVEREIGN." After the "GREAT HARRY," or "HARRY GRACE À DIEU," she was the next British ship of any note, and larger than any that had preceded her.

4. The "ROYAL WILLIAM," 100 guns, (on a $\frac{1}{2}$ in. scale), rigged, length 167 ft. 3 in., breadth 47 ft. 2 in., depth 18 ft., tonnage 1,568. Built at Chatham Yard 1670. She was rebuilt at Chatham in 1692, on the same lines as originally designed by Mr. Phineas Pett; but in 1719 was again rebuilt at Portsmouth, with alterations, when her dimensions were, length 175 ft. 4 in., breadth 50 ft. 3½ in., depth 20 ft. 1 in., tonnage 1,918; she was finally taken to pieces in August 1813. MODEL No. 7 represents this ship after the alterations made in her in 1719.

5. A MODEL (on about a $\frac{1}{2}$ in. scale), representing a 100-gun ship of about the year 1700, but name not known.

6. The "BRITANNIA," 100 guns, (on a $\frac{1}{4}$ in. scale), length 167 ft. 5 in., breadth 48 ft. 8 in., depth 19 ft. 7½ in., tonnage 1,703. Built at Chatham Yard in 1682, rebuilt at Woolwich in 1719. Designed by Sir Phineas Pett.

7. The "ROYAL WILLIAM," 100 guns, (on a $\frac{1}{4}$ in. scale), rigged, length 175 ft. 4 in., breadth 50 ft. 3½ in., depth 20 ft. 1 in., tonnage 1,918. She was originally built at Chatham Yard in 1682, on a design by Sir Phineas Pett, but was rebuilt in 1692, and again in 1719, when she was constructed of the above dimensions. (See MODEL No. 4.)

8. A MODEL supposed to be "ROYAL WILLIAM," but date uncertain (on about a $\frac{1}{4}$ in. scale).

9. The "VICTORY," 100 guns, rigged, (on about a $\frac{3}{4}$ in. scale), length 174 ft. 9 in., breadth 50 ft. 6 in., depth 20 ft. 6 in., tonnage 1,921. Built at Portsmouth Yard in 1737, lost in the English Channel in the night between the 4th and 5th October 1744, when Admiral Balchen and his crew of upwards of 1,000 men perished.

Designed by Mr. Joseph Allen.

10. The "RAMILLIES," 90 guns, (on a $\frac{1}{4}$ in. scale), length 168 ft., breadth 48 ft., depth 20 ft. 2 in., tonnage 1,679. Laid down at Portsmouth Yard in 1742, launched in 1748, wrecked off the Start 14th February 1760.

Designed by Mr. Peir Lock.

11. The "ROYAL GEORGE," 100 guns, (on a $\frac{1}{4}$ in. scale), length 178 ft., breadth 51 ft. 9 $\frac{1}{2}$ in., depth 21 ft. 6 in., tonnage 2,041. Laid down at Woolwich Yard in 1746, launched in 1756, wrecked in 1782.

Designed by Mr. J. Pownoll.

The armament was as follows :

	No.	Prs.
Lower deck	28	42
Middle "	28	24
Main "	28	12
Quarter "	12	12
Forecastle	4	12
	<hr/> 100	

This ship, the flag ship of Admiral Kempenfelt, was "overset at Spithead, 29th August 1782, whilst being "heeled in order to come at the pipe that leads to the "well," and sank with the Admiral and a crew of 800 men on board.

The vessel remained in the spot where she had sunk until the year 1839, when by means of the diving bell many of her guns and stores were recovered ; her hull was then blown to pieces by charges of gunpowder and thus floated.

Many interesting relics of this ship will be found arranged in another part of the gallery. (See Class XIII., Div. F.)

12. The "VICTORY," 100 guns, rigged, (on a $\frac{1}{10}$ in. scale), length 186 ft., breadth 52 ft. 4 $\frac{1}{2}$ in., depth 21 ft. 6 in., tonnage 2,164. Laid down at Chatham Yard in 1759, launched 7th May 1765. Designed by Sir Thomas Slade.

The armament was as follows :

	No.	Prs.
Lower deck	30	42
Middle "	28	24
Main "	30	12
Quarter "	10	6
Forecastle	2	6
	<hr/> 100	

This vessel was the flag ship of Lord Nelson in the action of Trafalgar, on board which he caused that ever memorable signal to be made, "England expects every man to do his "duty," and it was on the quarter deck of this vessel that

he received his mortal wound from a ball fired from the mizen-top of the French ship "REDOUTABLE."

13. The "VICTORY," 100 guns, on a launch, (on a $\frac{1}{8}$ in. scale). A MODEL of the same ship as the preceding. (See also No. 1, Class XL, page 243.)

14. The "ROYAL SOVEREIGN," 100 guns, (on a $\frac{1}{6}$ in. scale), of about the year 1765, but exact date not known.

15. The "PRINCESS ROYAL," 98 guns, (on a $\frac{1}{4}$ in. scale), length 177 ft. 6 in., breadth 50 ft. 6 in., depth 21 ft., tonnage 1,973. Laid down at Portsmouth Yard in 1767, launched in 1773, broken up at Chatham Yard in 1807.

Designed by Sir Thomas Slade on the lines of the "BARFLEUR," a vessel designed by him and launched at Chatham in 1768.

The armament was as follows :

	No.	Prs.
Lower deck	28	82
Middle „	30	18
Main „	30	12
Quarter „	8	12
Forecastle	2	12
	98	

The complement of men was 738.

16. The "DUKE," 98 guns, (on a $\frac{1}{4}$ in. scale), length 177 ft. 6 in., breadth 50 ft. 2 in., depth 21 ft. 2 in., tonnage 1,943. Laid down at Devonport Yard in October 1772, launched 18th October 1777, broken up at Sheerness in 1843.

Designed by Sir J. Williams.

There were also built on the same lines the "ATLAS" in 1782, "ST. GEORGE" in 1785, and the "GLORY" in 1788.

The armament was as follows :

	No.	Prs.
Lower deck	28	32
Middle „	30	18
Main „	30	12
Quarter „	8	12
Forecastle	2	12
	98	

The complement of men was 738.

17. The "ROYAL GEORGE," 100 guns, (on a $\frac{1}{8}$ in. scale) length 190 ft., breadth 52 ft. 5 $\frac{1}{2}$ in., depth 22 ft. 4 in.

tonnage 2,286. Laid down at Chatham Yard in 1784, launched in 1788, broken up at Devonport in 1822.

Designed by Mr. Edward Hunt.

The armament was as follows :

	No.	Prs.
Lower deck - -	30 -	42
Middle „ - -	28 -	24
Main „ - -	30 -	12
Quarter „ - -	10 -	12
Forecastle - -	2 -	12

100

18. The “ROYAL GEORGE,” 100 guns, (on a $\frac{1}{4}$ in. scale). A MODEL of the same ship as the preceding (No. 17).

19. The “QUEEN CHARLOTTE,” 100 guns, (on a $\frac{1}{2}$ in. scale), length 190 ft., breadth 52 ft. $5\frac{1}{2}$ in., depth 22 ft. 4 in., tonnage 2,286. Laid down at Chatham Yard in 1785, launched in 1790, burnt off Leghorn in 1800.

Designed by Mr. Edward Hunt, as sister ship to the “ROYAL GEORGE,” which was launched at Chatham in 1788.

The armament was as follows :

	No.	Prs.
Lower deck - -	30 -	32
Middle „ - -	28 -	24
Main „ - -	30 -	18
Quarter „ - -	10 -	12
Forecastle - -	2 -	12

100

20. The “VILLE DE PARIS,” 110 guns, (on a $\frac{1}{4}$ in. scale), length 190 ft. $2\frac{1}{2}$ in., breadth 53 ft. $2\frac{1}{2}$ in., depth 22 ft. $2\frac{1}{2}$ in., tonnage 2,351. Laid down at Chatham Yard 1st July 1789, launched 17th July 1795, broken up at Pembroke in 1845.

Designed by Sir John Henslow.

The armament was as follows :

	No.	Prs.
Lower deck - -	30 -	32
Middle „ - -	30 -	24
Main „ - -	32 -	18
Quarter „ - -	14 -	12
Forecastle - -	4 -	12

110

The complement of men was 837.

21. An unfinished MODEL (on about a $\frac{1}{4}$ in. scale), representing a 120-gun ship of about the year 1800.

22. The "CALEDONIA," 120 guns, (on a $\frac{1}{4}$ in. scale), length 205 ft., breadth 54 ft. 6 in., depth 23 ft. 2 in., tonnage 2,616. Laid down at Devonport Yard in 1805, launched in 1808. Designed by Sir William Rule.

There were also built on the same lines the "BRITANNIA," launched at Plymouth in 1820, "PRINCE REGENT," at Chatham in 1823, "ROYAL GEORGE," at Chatham in 1827.

The armament was as follows:

	No.	Prs.
Lower deck	32	32
Middle „	34	24
Main „	34	18
Quarter „	16	12
Forecastle	4	12
	120	

The complement of men was 875.

In 1856 she was appropriated as the Hospital Ship at Greenwich and her name changed to "DREADNOUGHT." She was considered in her day the most perfect of her class in every quality, and was the favourite ship of Lord Exmouth.

23. The "QUEEN," 110 guns, rigged and in dock, (on a $\frac{1}{2}$ in. scale), length 204 ft., $2\frac{1}{2}$ in., breadth 60 ft. $0\frac{1}{2}$ in., depth 23 ft. 9 in., tonnage 3,104. Laid down at Portsmouth Yard in 1833, launched in 1839.

Designed by Sir Wm. Symonds.

The armament was as follows:

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower deck	24	32	56	9 6
" "	6	8 in.	65	9 0
Middle „	26	32 prs.	56	9 6
" "	4	8 in.	65	9 0
Main „	30	32 prs.	41	8 0
Quarter „	14	32	25	6 0
" "	6	32	45	8 6
	110			

The complement of men was 900.

Her name was originally "ROYAL FREDERICK," but it was changed to "QUEEN" in 1839. She was converted to a

screw 2-decked ship in 1859 at Sheerness, but the MODEL and above dimensions are as she was built for a sailing ship.

24. The "QUEEN," 110 guns, (on a $\frac{1}{4}$ in. scale). Another MODEL of the same ship as the preceding.

25. The "ROYAL ALBERT," 120 guns (on a $\frac{1}{4}$ in. scale), length 220 ft., breadth 60 ft. 10 in., depth 25 ft., tonnage 3,394. Laid down at Woolwich Yard in 1844.

Designed by Mr. Oliver Lang.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower deck	- 4	- 8 in.	- 65	- 9 0
" "	- 28	- 32 prs.	- 56	- 9 6
Middle "	- 2	- 8 in.	- 65	- 9 0
" "	- 32	- 32 prs.	- 50	- 9 0
Main "	- 34	- 32 "	- 42	- 8 0
Upper "	- 6	- 32 "	- 45	- 8 6
	14	- 32 "	- 17 carronades.	

120

The complement of men was 1,000.

This vessel was never launched as a sailing ship, but in 1852 was ordered to be converted to a screw ship and was launched as such in 1854.

The MODEL and above dimensions are as designed for a sailing ship.

26. The "HOWE," 121 guns, 1,000 horse-power (on a $\frac{1}{4}$ in. scale), length 260 ft., breadth 61 ft. 1 in., depth 26 ft. 4 in., tonnage 4,245. Laid down at Pembroke Yard in 1856, launched in 1860.

Designed by Surveyor's Department.

The armament of the ship was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower deck	- 32	- 8 in.	- 65	- 9 0
Middle "	- 30	- 8 "	- 65	- 9 0
Main "	- 32	- 32-prs.	- 58	- 9 6
Upper "	- { 26	- 32 "	- 42	- 8 0
	1	- 68 " pivot	95	- 10 0

121

The complement of men was 1,130.

This ship was not built as originally designed, as she was

lengthened by the bow 15 feet in 1858. The MODEL and the above dimensions represent the ship as she was actually built.

LINE-OF-BATTLE SHIPS OF TWO DECKS.

29. The "BRISTOL," 50 guns, (on about $\frac{1}{4}$ in. scale), length 130 ft., breadth 34 ft., depth 13 ft. 6 in., tonnage 670. Built at Portsmouth Yard in 1653; she was rebuilt at Deptford in 1693, and captured and sunk by Mons. De Guee's squadron 25th April 1709. Designed by Mr. Tippetts.

The complement of men was 240.

30. A MODEL, (on about a $\frac{1}{6}$ inch scale), representing a 50-gun ship, full rigged, of about the year 1670.

31. The "OXFORD," 70 guns, (on a $\frac{1}{4}$ in. scale), length 150 ft. 5 in., breadth 40 ft. 6 in., draught 17 ft. 1 in., tonnage 1,051. Built at Deptford Yard in 1698.

Designed by Mr. Snelgrove.

32. A MODEL, (on a $\frac{1}{4}$ in. scale), representing a 50-gun ship of about the year 1701.

The name of the ship is not known.

33. A MODEL, (on a $\frac{1}{4}$ in. scale), representing a 50-gun ship of about the year 1701.

The name of the ship is not known.

34. A MODEL of a 42-gun ship of about the year 1700. The name of the ship is not known.

35. A MODEL of a 64-gun ship of about the year 1740. The name of the ship is not known.

36. The "ELIZABETH," 70 guns, (on a $\frac{1}{4}$ in. scale), length 151 ft., breadth 43 ft. 6 in., depth 17 ft. 9 in., tonnage 1,224. Laid down at Chatham Yard, and launched in 1737. Broken up at Portsmouth in 1766.

Designed by Mr. John Ward.

37. The "SALISBURY," 50 guns, (on a $\frac{1}{4}$ in. scale), length 140 ft., breadth 40 ft. 2 in., depth 17 ft. $2\frac{1}{2}$ in., tonnage 976. Laid down at East Cowes, and launched in 1745; condemned in the East Indies by survey in 1761.

Designed by Mr. Philip Ewer.

38. The "HAMPTON COURT," 64 guns, (on a $\frac{1}{4}$ in. scale), length 154 ft., breadth 44 ft., depth 18 ft. 11 in., tonnage

1783. Laid down at Deptford Yard in 1742, launched in 1744, broken up at Plymouth in 1774.

Designed by Mr. Joseph Allen, jun.

39. The "GRAFTON," 70 guns, (on a $\frac{1}{2}$ in. scale), length 160 ft., breadth 45 ft., depth 19 ft. 4 in., tonnage 1,414. Laid down at Portsmouth Yard in 1745, launched 1750. Sold at Chatham in 1767.

Designed by Mr. Peir Lock.

The complement of men was 520.

40. The "MARE," 64 guns, (on a $\frac{1}{2}$ in. scale), length 159 ft. 3 in., breadth 44 ft. 9 $\frac{1}{2}$ in., depth 18 ft. 4 in., tonnage 1,374. Captured from the French by H.M.S. "NOTTINGHAM" in October 1746 off Cape Clear, and wrecked off Halifax Harbour in 1755.

Her armament was as follows:

	No.	Prs.
Lower deck	26	24
Main "	28	12
Quarter "	8	6
Forecastle	2	6

64 guns.

Her complement of men was 470.

41. "MARE," 74 guns, (on a $\frac{1}{2}$ in. scale), length 165 ft. 6 in., breadth 46 ft. 8 in., depth 19 ft. 9 in., tonnage 1,556. Laid down at Woolwich Yard on 1st May 1756, launched 15th March 1759, sold in 1784.

Designed by Sir Thomas Slade.

The armament was as follows:

	No.	Prs.
Lower Deck	28	32
Main "	28	18
Quarter "	14	9
Forecastle	4	9

74 guns.

The complement of men was 650.

42. The "MARINANIME," 70 guns, (on a $\frac{1}{2}$ in. scale), length 173 ft. 7 in., breadth 49 ft. 6 in., depth 21 ft. 7 in., tonnage 1,822. Captured from the French by the "NOTTINGHAM" and "PORTLAND," 31st January 1747. Reported

to have been built in the year 1744. Broken up at Plymouth in the year 1775.

The armament was as follows :

			No.			Prs.
Lower deck	-	-	28	-	-	32
Main „	-	-	30	-	-	18
Quarter „	-	-	10	-	-	9
Forecastle	-	-	2	-	-	9
<hr/>						
70 guns.						

The complement of men was 700.

43. The “TROYTON,” 50 guns, (on a $\frac{1}{4}$ in. scale). Apparently of about the year 1750.

44. The “FALMOUTH,” 50 guns, (on a $\frac{1}{4}$ in. scale), length 144 ft., breadth 41 ft. 2 in., depth 17 ft. 8 in., tonnage 1,047. Laid down at Woolwich Yard in 1746, launched in 1752; left at Batavia in 1765, being in too bad a condition to be brought to England. Designed by Mr. A. Hayes.

There was also built on the same lines the “PRESTON” at Deptford in 1757.

The complement of men was 350.

45. The “RIPON,” 60 guns, (on a $\frac{1}{4}$ in. scale), length 155 ft. 5 in., breadth 42 ft. 6 in., depth 18 ft. 7 in., tonnage 1,229. Laid down at Woolwich Yard in 1752, launched in 1758, broken up at Plymouth in 1808.

Designed by Sir Joseph Allen.

46. The “TRIUMPH,” 74 guns, (on a $\frac{1}{4}$ in. scale), length 171 ft. 3 in., breadth 49 ft. 9 in., depth 21 ft. 3 in., tonnage 1,825. Laid down at Woolwich Yard in 1758, launched in 1764.

Designed by Sir Thomas Slade on the same lines as the “INVINCIBLE,” captured from the French by Lord Anson and Sir Peter Warren on the 3rd May 1747.

The armament was as follows :

			No.			Prs.
Gun deck	-	-	28	-	-	32
Upper „	-	-	30	-	-	18
Quarter „	-	-	12	-	-	9
Forecastle	-	-	4	-	-	9
<hr/>						
74 guns.						

The complement of men was 650.

47. The "BELLONA," 74 guns, (on a $\frac{1}{4}$ in. scale), length 168 ft., breadth 46 ft. 11 in., depth 19 ft. 9 in., tonnage 1,615. Laid down at Chatham Yard in 1758, launched in 1760, broken up at Chatham in 1814.

Designed by Sir Thomas Slade.
The complement of men was 650.

48. The "ESSEX," 64 guns, (on a $\frac{1}{4}$ in. scale), length 158 ft. $1\frac{1}{2}$ in., breadth 44 ft. $8\frac{1}{2}$ in., depth 18 ft. 10 in., tonnage 1,379. Built by contract by Mr. T. Staunton and Mr. Wm. Wells at 16*l* 3*s* per ton. Laid down at Rotherhithe in 1759, launched in 1760, sold at Portsmouth in 1799.

Designed by Sir Thomas Slade.
The complement of men was 500.

49. MODEL (on a $\frac{1}{4}$ in. scale), representing a 64-gun ship of about the year 1760.

50. The "RAMILLIES," 74 guns, (on a $\frac{1}{4}$ in. scale), length 168 ft. 6 in., breadth 46 ft. $11\frac{1}{2}$ in., depth 19 ft. 9 in., tonnage 1,619. Laid down at Chatham Yard in 1760, launched in 1763.

Designed by Sir Thomas Slade.
The complement of men was 630.

"In her passage home from the West Indies she received great damage in a violent hurricane off the banks of Newfoundland, and became very leaky, so that Admiral Graves was obliged to quit her, and caused her to be destroyed 21st September 1782."

51. The "ALFRED," 74 guns, on a launch, (on a $\frac{1}{4}$ in. scale), length 169 ft., breadth 47 ft. 2 in., depth 20 ft., tonnage 1,638. Laid down at Chatham Yard in 1772, launched in 1778, broken up at Portsmouth in 1814.

Designed by Sir John Williams.

The armament was as follows :

	No.	Prs.
Lower deck	- 28 -	- 32
Main " -	- 28 -	- 18
Quarter " -	- 14 -	- 9
Forecastle -	- 4 -	- 9

74 guns.

52. The "INDEFATIGABLE," 64 guns, (on a $\frac{1}{4}$ in. scale), length 160 ft. $1\frac{1}{2}$ in., breadth 44 ft. 5 in., depth 19 ft., tonnage 1,384. Built by contract by Mr. Henry Adams. Laid down at Bucklers Hard in 1781, launched in 1784, broken up at Sheerness in 1816.

Designed by Sir Thomas Slade.

There was also built on the same lines the "RAISONABLE," at Chatham, in 1768.

The armament was as follows :

	No.	Prs.
Lower deck	26	24
Main „	26	18
Quarter „	10	9
Forecastle	2	9

64 guns.

The complement of men was 500.

This vessel was in 1795 altered to a 38-gun ship.

53. The "CÆSAR," 80 guns, (on a $\frac{1}{4}$ in. scale), length 181 ft., breadth 50 ft. 5 in., depth 22 ft. 11 in., tonnage 2,003. Laid down at Plymouth Yard in 1786, launched in 1793, broken up at Plymouth in 1821.

Designed by Mr. Edward Hunt.

The armament was as follows :

	No.	Prs.
Lower deck	30	32
Main „	32	24
Quarter „	14	9
Forecastle	4	9

80 guns.

The complement of men was 719.

54. The "FOUDROYANT," 80 guns, (on a $\frac{1}{4}$ in. scale), length 183 ft. 8 $\frac{1}{2}$ in., breadth 50 ft. 7 $\frac{3}{4}$ in., depth 22 ft. 6 in., tonnage 2,062. Laid down at Plymouth Yard in 1789, launched in 1798.

Designed by Sir John Henslow.

The armament was as follows :

	No.	Prs.
Lower deck	30	32
Main „	32	24
Quarter „	14	12
Forecastle	4	12

80 guns.

The complement of men was 719.

55. The "RODNEY," 92 guns, (on a $\frac{1}{4}$ in. scale), length 205 ft. 6 in., breadth 54 ft. 5 $\frac{1}{2}$ in., depth 23 ft. 1 in., tonnage 2,626. Laid down at Pembroke Yard in 1827, launched in 1833, converted to a screw ship at Chatham in 1860.

Designed by Sir Robert Seppings.

There were also built on the same lines the "LONDON," at Chatham, in 1840, and the "NILE," at Plymouth, in 1839.

The armament was as follows :

	No.	Prs.
Lower deck { - -	26 - -	32 prs.
- -	6 - -	8 in.
Main " { - -	30 - -	32 prs.
- -	4 - -	8 in.
Quarter " - -	26 - -	32 prs.
<hr/>		
92 guns.		

The complement of men was 695.

56. The "VANGUARD," 80 guns, (on a $\frac{1}{4}$ in. scale), length 190 ft., breadth 57 ft., depth 23 ft. 4 in., tonnage, 2,609. Laid down at Pembroke Yard in 1833, launched in 1835.

Designed by Sir Wm. Symonds.

There was also built on the same lines the "GOLIATH," at Chatham, in 1842.

The armament was as follows :

	No.	Prs.
Lower deck { - -	20 - -	32 prs.
- -	8 - -	8 in.
Main " { - -	24 - -	32 prs.
- -	4 - -	8 in.
Quarter " - -	24 - -	32 prs.
<hr/>		
80 guns.		

57. A MODEL (on a $\frac{1}{8}$ in. scale), representing a 98-gun ship of about the year 1840.

Name not known.

58. The "CUMBERLAND," 70 guns, (on a $\frac{1}{4}$ in. scale), length 180 ft., breadth 54 ft. 3 in., depth 22 ft. 4 in., tonnage 2,214. Laid down at Chatham Yard in 1836, launched in 1842.

Designed by Sir Wm. Symonds.

There was also built on the same lines the "BOSCAWEN," at Woolwich in 1844.

The armament was as follows :

	No.	Prs.
Lower deck {	- 22 -	32 prs.
	- 4 -	8 in.
Main „ {	- 26 -	32 prs.
	- 2 -	8 in.
Quarter „	- 16 -	32 prs.
<hr/> 70 guns.		

The complement of men was 600.

FRIGATES.

70. The “DIANA,” 38 guns, (on a $\frac{1}{4}$ in. scale,) length 146 ft. 3 in., breadth 39 ft. $3\frac{1}{2}$ in., depth 13 ft. 9 in., tonnage 998. Built by contract in the river Thames, by Messrs. Randall & Co. Launched in 1794, sold to the Dutch Government in 1815. Designed by Sir J. Henslow.

The armament was as follows :

	No.	Prs.
Main deck	- 28 -	18
Quarter „	- 8 -	9
Forecastle	- 2 -	9
<hr/> 38 guns.		

The complement of men was 284.

71. “DIANA,” 38 guns, (on a $\frac{1}{4}$ in. scale,) on a launch. Same ship as No. 70. (*See also* No. 2, Class XI., page 244.)

72. The “ARTOIS,” 38 guns, on a launch, (on a $\frac{1}{4}$ in. scale,) length 146 ft. 3 in., breadth 39 ft. $2\frac{1}{2}$ in., depth 13 ft. 9 in., tonnage 996. Built in the river Thames, by Messrs. J. & W. Wells, launched in 1794. Lost on the coast of France in 1797. Designed by Sir J. Henslow.

The armament was as follows :

	No.	Prs.
Main deck	- 28 -	18
Quarter „	- 8 -	9
Forecastle	- 2 -	9
<hr/> 38 guns.		

The complement of men was 284. (*See also* No. 3, Class XI., page 244.)

73. A MODEL (on a $\frac{1}{4}$ in. scale), representing a 50-gun frigate of about the year 1796.

Name not known.

74. The "MODESTE," 36 guns, (on a $\frac{1}{4}$ in. scale), length 143 ft. $6\frac{1}{2}$ in., breadth 38 ft. 8 in., depth 12 ft. $1\frac{1}{2}$ in., tonnage 940. Captured from the French in 1793. Broken up at Deptford in June 1814.

The armament was as follows :

	No.	Prs.
Main deck	26	18
Quarter „	8	9
Forecastle	2	9
	<hr/> 36	

The complement of men was 264.

75. The "LACEDEMONIAN," 38 guns, (on a $\frac{3}{8}$ in. scale), length, 150 ft. 4 in., breadth 40 ft. $0\frac{1}{2}$ in., depth 12 ft. $9\frac{1}{2}$ in., tonnage 1,073. Laid down at Portsmouth Yard in 1810, launched in 1812, broken up at Portsmouth in 1822. Built on the same lines as the "HEBE," captured from the French in 1782.

76. The "PSYCHE," 32 guns, (on a $\frac{1}{8}$ in. scale), length 130 ft., breadth 36 ft. 7 in., depth 10 ft. 3 in., tonnage 769.

The armament was as follows :

	No.	Prs.
Main deck	26	24 carronades.
Quarter „	2	24-prs.
Forecastle	2	24-prs.
„	2	32-prs.
	<hr/> 32	

The complement of men was 300.

The "PSYCHE" was laid down at Chatham in January 1814, and her frame taken down in February 1814, for conveyance to America to be built on the Lakes.

77. The "VERNON," 50 guns, (on a $\frac{1}{4}$ in. scale), length 176 ft., breadth 52 ft. $8\frac{1}{2}$ in., depth 16 ft. 5 in., tonnage 2,082. Laid down at Woolwich Yard in 1831, launched in 1832. Designed by Sir Wm. Symonds.

The armament was as follows :

	No.	Prs.
Main deck - - -	22	32
" " - - -	6	8-in.
Upper " - - -	22	32-prs.
	<hr/> 50	
	guns.	

The complement of men was 500.

78. The "PIQUE," 40 guns, (on a $\frac{1}{4}$ in. scale), length 160 ft., breadth 48 ft. 10 $\frac{1}{2}$ in., depth 14 ft. 7 in., tonnage 1,633. Laid down at Devonport Yard in 1833, launched in 1834. Designed by Sir Wm. Symonds.

There were also built on the same lines the "FLORA," at Devonport in 1844, and the "CAMBRIAN," at Pembroke in 1841.

The complement of men was 350.

79. The "TIGER," 16 guns, 400 horse-power, (on a $\frac{1}{4}$ in. scale), length 205 ft., breadth 35 ft. 11 $\frac{7}{8}$ in., depth 24 ft. 6 in., tonnage 1,221. Laid down in a dock at Chatham Yard in 1847. Undocked in 1849.

Designed by Mr. J. Edye, Assistant Surveyor of the Navy.

There was also built on the same lines the "MAGICIENNE," at Pembroke in 1849.

The armament was as follows :

	No.	Prs.
Main deck - - -	8	32
Upper " - - -	2	10-in.
	6	32
	<hr/> 16	

Grounded off Odessa in a fog on 12th May 1854, when she was surrendered to the Russians, and sunk by them.

80. The "EURYALUS," 51 guns, 400 horse-power, (on a $\frac{1}{4}$ in. scale), length 212 ft., breadth 50 ft. 2 in., depth 16 ft. 9 in., tonnage 2,371. Laid down in a dock at Chatham in 1851, undocked in 1853.

Designed by Surveyor's Department.

There were also built on the same lines the "IMPERIEUSE," at Deptford in 1852, the "CHESAPEAKE," at Chatham in 1855, and the "FORTE," at Deptford in 1858.

The armament was as follows :

		No.			Prs.
Main deck	{	8	-	-	8-in.
		22	-	-	32-prs.
Upper „	{	2	-	-	8-in.
		18	-	-	32-prs.
		1	-	-	68-pr. pivot.
<hr/>					
51 guns.					

81. The “IMMORTALITÉ,” 50 guns, 600 horse-power, (on a $\frac{1}{4}$ in. scale), length 251 ft., breadth 52 ft. 1 in., depth 16 ft. 8 in., tonnage 3,059. Laid down at Pembroke Yard in 1849 as a sailing ship, conversion to a screw commenced in 1856, launched in 1859.

Designed by Surveyor's Department.

The armament was as follows :

		No.			Prs.
Main deck	-	30	-	-	8-in.
Upper „ {	-	20	-	-	32-prs.
	-	1	-	-	68-pr. pivot.
<hr/>					
51 guns.					

The above dimensions and the model represent the ship as she was actually built.

SLOOPs, BRIGs, &c.

95. The “HAPPY,” 8 guns, (on a $\frac{1}{4}$ in. scale,) length 75 ft. 6 in., breadth 20 ft. 7 $\frac{1}{2}$ in., depth 9 ft. 4 in., tonnage 140. Laid down at Woolwich Yard in 1753, launched in 1754, lost in 1764.

Designed by Mr. Edward Allen.

The armament was as follows :

No.		Prs.
8	-	3
10	-	$\frac{1}{2}$ pr. swivels.

Her complement of men was 50.

96. The “MERLIN,” 24 guns, (on a $\frac{1}{4}$ in. scale), length 106 ft. 2 in., breadth 28 ft. 2 $\frac{1}{2}$ in., depth 13 ft. 10 in., tonnage 371. Built by contract by Mr. Dudman in 1796, broken up at Deptford in 1803.

Designed by Sir Wm. Rule.

The armament was as follows :

	No.	Prs.
Upper deck	16	6
Quarter „	6	12 carronades.
Forecastle	2	12 „
	<hr/> 24	

Complement of men 121.

97. The “LADY NELSON.” Built upon a plan of Admiral Schank’s, about 1790 (on a $\frac{1}{4}$ in. scale).

98. The “WOLVERINE,” armed transport, (on about a $\frac{1}{4}$ in. scale), length, breadth, depth, and tonnage not known. Purchased in 1798.

99. The “TERROR,” (on a $\frac{1}{4}$ in. scale), length 102 ft. $4\frac{1}{2}$ in., breadth, 26 ft. $11\frac{1}{2}$ in., depth 12 ft. $11\frac{1}{2}$ in., tonnage 326. Commenced building by Mr. Davy at Topsham in 1812, launched in 1813. Designed by Sir H. Peake.

This vessel was employed in Arctic and Antarctic expeditions. In 1845 she was fitted with a screw propeller, and sailed with Sir J. Franklin’s expedition, from which she never returned.

100. The “PYLADES,” 18 guns, (on a $\frac{1}{4}$ in. scale), length 110 ft. 1 in., breadth 30 ft. $4\frac{1}{4}$ in., depth 8 ft. 2 in., tonnage 433. Laid down at Woolwich Yard in March 1823, launched in June 1824, broken up in May 1845.

Designed by Sir Robert Seppings.

The armament was as follows :

No.	Prs.
16	32 carronades.
2	9 „
<hr/> 18	

The complement of men was 125.

101. The “ROVER,” 18 guns, (on a $\frac{1}{4}$ in. scale), length 113 ft., breadth 35 ft. 5 in., depth 16 ft. 9 in., tonnage 590. Laid down at Chatham Yard in 1832, launched in 1832, broken up at Chatham in 1845.

Designed by Sir Wm. Symonds.

The armament was follows :

	No.	Prs.
Upper deck	18	32

102. The "FLYING FISH," 10 guns, (on a $\frac{1}{4}$ in. scale), length 103 ft. 1 in., breadth 32 ft. $4\frac{1}{2}$ in., depth 14 ft. $4\frac{1}{2}$ in., tonnage 445. Laid down at Pembroke Yard in 1843, launched in 1844, broken up in 1852.

Designed by Sir W. Symonds.

There was also built on the same lines the "KINGFISHER" at Pembroke in 1845.

103. The "PANDORA," packet, 4 guns, (on a $\frac{1}{4}$ in. scale), length 90 ft., breadth 29 ft. $2\frac{1}{2}$ in., depth 13 ft. 10 in., tonnage 319. Laid down at Woolwich Yard in 1832, launched in 1833, sold in 1862.

Designed by Sir Wm. Symonds.

The armament was as follows:

	No.	Prs.
Upper deck	4	9

104. The "PILOT," 16 guns, (on a $\frac{1}{4}$ in. scale), length 105 ft. $0\frac{1}{2}$ in., breadth 33 ft. 6 in., depth 14 ft. 10 in., tonnage 485. Laid down at Devonport Yard in 1837, launched in 1838, sold in 1862.

Designed by Sir Wm. Symonds.

The armament was as follows:

	No.	Prs.
Upper deck {	2	18
	14	32
	<hr/> 16	

Her complement of men was 130.

There were also built on the same lines the "ACORN," "ALBATROSS," "ARAB," "BITTERN," "DESPATCH," "ELK," "FANTOME," "GRECIAN," "HERON," "KANGAROO," "MARINER," "MARTIN," and "PERSIAN."

105. The "MODESTE," 18 guns, (on a $\frac{1}{4}$ in. scale), length 120 ft., breadth 33 ft. $2\frac{1}{2}$ in., depth 14 ft. 2 in., tonnage 568. Laid down at Woolwich Yard in 1837, launched in 1837.

Designed by Admiral the Hon. George Elliot.

The armament was as follows:

	No.	Prs.
Upper deck	18	32

Her complement of men was 145.

106. The "DIDO," 18 guns, (on a $\frac{1}{4}$ in. scale), length 120 ft., breadth 37 ft. 8 in., depth 18 ft., tonnage 734. Laid down at Pembroke Yard in 1834, launched in 1836.

Designed by Sir W. Symonds.

There was also built on the same lines the "DAPHNE," launched at Pembroke in 1838.

Her armament was as follows :

	No.	Prs.
Upper deck	18	32

Her complement of men was 175.

107. The "SIREN," 16 guns, (on a $\frac{1}{4}$ inch scale), length 110 ft., breadth 34 ft. 10 in., depth 14 ft. 10 in., tonnage 549. Laid down at Woolwich Yard in 1839, launched in 1841.

Designed by Sir Wm. Symonds.

There were also built on the same lines the "ATALANTA," "CAMILLA," "HELENA," "JUMNA," "MOSQUITO," and "ROVER."

The armament was as follows :

	No.	Prs.
Upper deck	16	32

108. MODEL of a Corvette (on a $\frac{1}{4}$ in. scale).

Proposed by Captain Fishbourne about the year 1845, designed on the wave principle.

109. A 12-gun brig, of about the year 1851, (on a $\frac{1}{2}$ in. scale).

110. The "GULNARE," 3 guns, 130 horse-power, paddle, (on a $\frac{1}{4}$ in. scale), length 120 ft., breadth 23 ft. 3 in., depth 13 ft., tonnage 306. Laid down at Chatham Yard in 1833, launched in 1833, broken up in 1849, at Deptford.

Designed by Sir Wm. Symonds.

The armament was as follows :

	No.	Prs.
Upper deck	3	18

Her complement of men was 40.

She was lengthened 18 ft. at Chatham in 1839. Her name was altered to "GLENER" in 1837.

111. The "TARTARUS," 4 guns, 136 horse-power, paddle, (on a $\frac{1}{4}$ in. scale), length 145 ft., breadth 28 ft. 4 in., depth 15 ft. 1 in., tonnage 523. Laid down at

Pembroke Yard in 1833, launched in 1834, broken up at Malta in 1861. Designed by Sir Wm. Symonds.

The armament was as follows:

	No.	Prs.
Upper deck	4	32

112. The "PROMETHEUS," 5 guns, 200 horse-power, paddle, (on a $\frac{1}{4}$ in. scale), length 164 ft., breadth 32 ft. 8 in., depth 18 ft. 7 in., tonnage 796. Laid down at Sheerness Yard in 1839, launched in 1839, sold in 1863.

Designed by Sir Wm. Symonds.

The armament was as follows:

	No.	Prs.
Upper deck	5	32

There were also built on the same lines the "ALECTO," "POLYPHEMUS," and "ARDENT," launched respectively at Chatham Yard in 1839, 1840, and 1841.

113. The "GORGON," 6 guns, 320 horse-power, paddle, (on a $\frac{1}{4}$ in. scale), length 178 ft., breadth 37 ft. $6\frac{1}{2}$ in., depth 23 ft., tonnage 1,111. Laid down at Pembroke Yard in 1836, launched in 1837. Designed by Sir Wm. Symonds.

The armament was as follows:

	No.	Prs.
Upper deck {	4	32
	2	10 in.
	<hr/> 6	

Her complement of men was 160.

114. The "MERLIN," 4 guns, 312 horse-power, paddle, (on a $\frac{1}{4}$ in. scale), length 175 ft., breadth 33 ft. 2 in., depth 16 ft. $5\frac{1}{2}$ in., tonnage 889. Laid down at Pembroke Yard in 1838, launched in 1838, sold in 1863.

Designed by Sir Wm. Symonds.

The armament was as follows:

	No.	Prs.
Upper deck	4	32

There were also built on the same lines the "MEDUSA" and "MEDINA" respectively, at Pembroke Yard in 1838 and 1840.

115. The "CARADOC," iron, 2 guns, 350 horse-power, (on a $\frac{1}{4}$ in. scale), length 191 ft. $7\frac{3}{4}$ in., breadth 26 ft. $11\frac{1}{2}$ in., depth 14 ft., tonnage 676. Commenced building by Messrs. Ditchburn and Mare, at Blackwall, in 1846, launched in 1847.

Designed by Sir Wm. Symonds.

The armament was as follows:

	No.	Prs.
Upper deck	2	6

116. The "EMERSON," (on a $\frac{1}{4}$ in. scale), paddle-wheel vessel of about the year 1830, one of the first steam ships in the Royal Navy.

117. The "ACHERON," paddle-wheel vessel, 160 horse-power, (on a $\frac{1}{4}$ in. scale), length 150 ft. 1 in., breadth 32 ft. $9\frac{1}{2}$ in., depth 18 ft. $1\frac{1}{2}$ in., tonnage 722. Laid down at Sheerness Yard in October 1837, launched in August 1838, sold in April 1855.

Designed by Sir Wm. Symonds.

There was also built on the same lines the "VOLCANO" at Portsmouth in 1836.

The armament was as follows:

No.	Pr.
2	9 brass.
2	

The complement of men was 60.

118. The "AMAZON," 4 guns, 300 horse-power, (on a $\frac{1}{4}$ -inch scale,) length 187 ft., breadth 36 ft., depth 19 ft. 4 in., tonnage 1,081. Laid down at Pembroke Yard in July 1864.

Designed by Controller's Department and Mr. E. J. Reed.

There are also building on the same lines the "NIOBE" at Deptford, "VESTAL" at Pembroke, "NYMPHE," at Deptford, "BLANCHE" at Chatham, "DRYAD" at Devonport, and "DAPHNE" at Pembroke.

The armament is—

No.	
2	6 $\frac{1}{2}$ -ton guns.
2	64-pr. „
4	

YACHTS.

130. The "MERCURY," yacht, (on a $\frac{3}{8}$ in. scale). This was the yacht of the Commissioner of Portsmouth Yard about the year 1790.

131. The "ROYAL ADELAIDE," yacht, (frigate rigged, on a $\frac{1}{2}$ in. scale), length 50 ft., breadth 15 ft., depth 8 ft., tonnage 50. Begun at Sheerness in September 1833, completed in December 1833, then taken to pieces and the materials conveyed to Virginia Water, where they were again put together, and the vessel launched in May 1834.

Designed by Sir Wm. Symonds on the lines of the "PIQUE."

132. The "OSBORNE," royal yacht, paddle-wheel, 430 horse-power, (on a $\frac{1}{4}$ in. scale), length 200 ft. 1 in., breadth 33 ft., depth 22 ft. 1 in., tonnage 1,034. Laid down at Pembroke Yard in 1842, launched in 1843.

Designed by Sir Wm. Symonds.

Prior to 22nd Dec. 1854, this vessel was called the "VICTORIA AND ALBERT."

133. The "OSBORNE," royal yacht, paddle-wheel, 430 horse-power (on $\frac{1}{8}$ in. scale). The same ship as the preceding.

134. The "FAIRY," royal yacht, screw, 128 horse-power, (on a $\frac{1}{8}$ in. scale), length 144 ft. 8 in., breadth 21 ft. $1\frac{1}{2}$ in., depth 9 ft. 10 in., tonnage 312. Built at Black-wall Yard, by contract, by Messrs. Ditchburn and Mare. Launched in 1845.

Designed by Messrs. Ditchburn and Mare.

135. MODEL (on a $\frac{1}{4}$ in. scale) of a yacht, (paddle,) intended for an Admiralty yacht, about the year 1845.

136. The "VICTORIA AND ALBERT," royal yacht, paddle wheel, 600 horse-power, (on a $\frac{1}{4}$ in. scale), length 300 ft., breadth 40 ft. $3\frac{1}{4}$ in., depth 24 ft. 6 in., tonnage 2,345. Laid down at Pembroke Yard in 1854, launched in 1855.

Designed by Surveyor's Department.

For a short time, while building, this vessel was called the "WINDSOR CASTLE."

137. The "VICTORIA AND ALBERT," royal yacht, paddle wheel, 600 horse-power, (on a $\frac{1}{8}$ in. scale).

The same ship as the preceding.

138. The "ALBERTA," royal yacht, 160 horse-power, (on a $\frac{1}{4}$ in. scale), length 160 ft., breadth 22 ft. 8 in., depth

12 ft. 6 in., tonnage 391. Laid down at Pembroke Yard in 1863, launched in 1863.

Designed by Controller's Department.

139. MODEL (on a $\frac{1}{4}$ in. scale) of a famous screw steam yacht built by Mr. Laird, of Birkenhead.

140. The "AMERICA," yacht, (on a $\frac{1}{4}$ in. scale), length 95 ft. 1 in., breadth 22 ft. 6 in., draught, forward 7 ft., aft 11 ft., tonnage $210\frac{1}{4}$, speed 13 knots.

Designed and built by Mr. Steers in New York.

Rebuilt by Mr. Henry Pitcher at Northfleet.

Was in America during the early part of the Civil war, and sunk by the Federals. This is the famous yacht which came over from America in 1851 to challenge the yachts of England, and beat the "TITANIA" 4 minutes and 45 seconds in a run of 20 miles before the wind, and 45 minutes returning by the wind.

The advantage of the "AMERICA" may in some measure be attributed to her having cotton canvas instead of flax, and to the very superior manner in which her sails were cut, together with the fact that her tonnage was about double that of the "TITANIA."

SHOT-PROOF SHIPS, AFLOAT OR BUILDING.

150. The "EREBUS," iron, 16 guns, 200 horse-power, screw, (on a $\frac{1}{4}$ -inch scale,) length 186 ft. $8\frac{1}{2}$ in., breadth 48 ft. 6 in., depth 15 ft. $6\frac{1}{2}$ in., tonnage 1,954. Built by contract by Mr. Napier at Glasgow in 1856, launched in 1856.

Designed by Surveyor's Department, after a French model sent to England.

There were also built on the same lines the "TERROR" and "THUNDERBOLT."

The armament was as follows:

	No.	Prs.
Upper deck	16	68

These were the first iron-cased ships constructed for H.M. Navy.

151. The "PRINCE CONSORT," wood, 31 guns, 1,000 horse-power, screw, (on a $\frac{1}{4}$ -inch scale,) length 273 ft. 1 in., breadth 58 ft. 5 in., depth 19 ft. 10 in., tonnage 4,045. Laid down at Pembroke Yard in 1860, launched in 1862.

Designed by Controller's Department.

There were also built on the same lines the "CALEDONIA," 1,000 horse-power; "OCEAN," 1,000 horse-power; and "ROYAL OAK," 800 horse-power.

The armament was as follows :

	No.	Prs.
	<hr/> 16	- 68
Main deck	- { 4	- 110 Armstrongs.
	- { 8	- 6½-ton guns.
Upper „	- { 3	- 110-prs. Armstrongs.
	<hr/> 31	

Her complement of men was 605.

The ships of this class were originally designed and commenced as line-of-battle ships of 91 guns, 3,716 tons, and 800 horse-power; but, by Admiralty order of 14th May 1861, they were converted to armour-plated ships of 31 guns.

The MODEL represents the ship as iron-cased.

152. The "ACHILLES," iron, 20 guns, 1,250 horse-power, screw, (on a ¼-inch scale,) length 380 ft., breadth 58 ft. 3½ in., depth 21 ft. 1½ in., tonnage 6,121. Laid down at Chatham Yard in August 1861 in a dock, undocked in December 1863.

Designed by the Controller's Department, on lines very similar to the "WARRIOR" and "BLACK PRINCE" built in 1860.

The armament is as follows :

	No.	Prs.
	<hr/> 8	- 100-pr. 6½-ton guns.
Main deck	- { 8	- 6½-ton rifled guns.
	- { 4	- 6½-ton „
Upper „	- {	
	<hr/> 20	

Her complement of men is 705.

153. The "ENTERPRISE," wood, 4 guns, 160 horse-power, screw, (on a ¼-inch scale,) length 180 ft., breadth 36 ft. 0½ in., depth 16 ft 9¼ in., tonnage 993. Laid down in Deptford Yard in May 1862, launched in February 1864.

Designed by Controller's Department and Mr. E. J. Reed.

The armament is—

No.	
2	- 6½-ton guns.
2	- 100-pr. Somerset 6½-ton guns.
<hr/>	
4	
<hr/>	

Her complement of men is 129.

154. The "PALLAS," wood, 6 guns, 600 horse-power, screw (on a $\frac{1}{4}$ -inch scale,) length 225 ft., breadth 50 ft., depth 16 ft. 5 in., tonnage 2,372. Laid down at Woolwich Yard in October 1863, launched in March 1865.

Designed by Controller's Department and Mr. E. J. Reed.

The armament is—

No.	
4	- - 6½-ton guns.
2	- - 110-pr. Armstrong.
<hr/>	
6	
<hr/>	

155. The "PRINCE ALBERT," iron, shield ship, 4 guns, 500 horse-power, screw, (on a $\frac{1}{4}$ -inch scale,) length 240 ft., breadth 48 ft., depth 25 ft. 3 in., tonnage 2,529. Laid down at Messrs. Samuda's Yard, Blackwall, in 1862, launched in May 1864.

Designed by Controller's Department to carry her guns in revolving shields upon the plan of Captain C. P. Coles, R.N.

Her armament is—

4	- - 12-ton guns in turrets.
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156. The "WIVERN" (late "EL MONASSIR"), iron, shield ship, 4 guns, 350 horse-power, screw, (on a $\frac{1}{4}$ -inch scale,) rigged, length 220 ft. 3 in., breadth 42 ft. 4 in., depth 18 ft., tonnage 1,857. Built by Messrs. Laird at Birkenhead, launched 29th August 1863. There was also built on the same lines the "SCORPION" (late "EL TOUSSON"), at Birkenhead at the same time.

Her armament is four 12-ton guns in revolving shields, upon the plan of Captain C. P. Coles, R.N.

SHOT-PROOF SHIPS.—DESIGNS PROPOSED, BUT NOT ADOPTED.

160. MODEL (on a $\frac{1}{8}$ in. scale) of a design proposed by Commander E. Wilson in 1859, for a shot-proof gun vessel.

161. MODEL (on a $\frac{1}{4}$ in. scale) of a design proposed by Mr. Turner of Woolwich Yard in 1860, for an iron-cased ship.

162. MODEL (on a $\frac{1}{4}$ in. scale) of a design proposed by Mr. Turner of Woolwich Yard in 1861, for an iron-cased ship.

163. Full and section MODELS of a gun-boat, showing plans of armour-plates; (a.) shows box plates rolled, and ends and sides turned up; (b.) box plates rolled without ends; (c.) box plate and clip for armour to wooden ships. Patented by Mr. Jones, 1861.

164. MODEL of a design for a shot-proof ship.
Proposed by Mr. J. H. Key, 1861.

165. MODEL (on a $\frac{1}{8}$ in. scale) of a design proposed by Captain J. Ford in 1862, for an unsinkable shot-proof gun boat.

166. MODEL (on a $\frac{3}{8}$ in. scale) of a design proposed by Mr. W. Heath, of Constantinople, in 1862, for an armour-plated shield ship.

167. MODEL (on a $\frac{1}{4}$ in. scale) of a design proposed by Mr. J. Bermingham, in 1862, for a shot-proof ram.

168. MODEL of a design for a floating battery, fitted with screw. 1862.

169. MODEL of a design for a steam ram.
Proposed by Mr. McPherson, 1862.

170. Half MODEL showing a design for an armour-plated ship.
By Mr. E. T. Otway, 1862.

171. MODEL of a design for a shot-proof ship.
By Mr. Alexander Blue, 1862.

172. Design for a shot-proof frigate and ram, with a screw propeller abaft on each side.

Proposed by Mr. J. B. Row, 1862.

173. Design for a steam ram.

By Mr. C. J. Oliver, 1862.

174. MODEL (on a $\frac{1}{16}$ in. scale) of a design proposed by Mr. C. G. Braxton, in 1863, for a floating battery.

175. MODEL (on a $\frac{1}{4}$ in. scale) of a design proposed by Commander H. Johnstone, R.N., in 1863, for a shot-proof ship.

176. Two MODELS (*a.* and *b.*) showing designs for armour-plated vessels.

Proposed by Commander Bullock, R.N., 1863.

177. Three MODELS (*a.* *b.* and *c.*) showing designs proposed by M. Huron for iron-cased ships.

178. Design for a floating battery (coast defender).
By Mr. W. Jones, boiler maker, Liverpool.

MISCELLANEOUS.

185. MODEL (on a $\frac{1}{4}$ in. scale) of a design proposed by Sir William Congreve in 1809, for a mortar vessel intended to sail either end foremost.

186. MODEL (on a $\frac{1}{4}$ in. scale), proposed by Sir William Congreve in 1809, showing the mode of placing the powder boxes, tar barrels, &c. in a fire ship.

187. French MODEL of a proposed steam vessel, to be built with horizontal paddles and an inclined closed roof, supposed to have been intended to assist Napoleon I. to escape from Elba, prior to the battle of Waterloo.

188. MODEL, showing a proposal by Mr. E. C. Homer-sham, Master, Royal Navy, in 1861, to form vessels of large iron tubes, with sharp ends; two outside ones to go fore and aft, constituting the vessel, and two shorter ones between them, extending a certain distance from each end, which are to be kept empty.

189. The "GUADALOUPE" (on a $\frac{1}{4}$ in. scale), an iron vessel built by Mr. Laird, of Liverpool, about the year 1841.

190. Flat-bottomed steam-paddle vessel, with projecting gangway or sponson fore and aft, giving a greater breadth to the deck. A very early specimen of its class.

191. Design for an iron boat. By Mr. J. Husk, 1864.

192. Design for a vessel to fire guns under water.
By Mr. R. Burley, 1862.

193. Design for a gun-boat.
Proposed by Mr. Acherson, 1855.

194. Three MODELS of paddle-wheel steam vessels, showing all the guns to train on a fore and aft line.
Before 1833, but exact date not known.

195. Three plans for screw steam vessels.
By Mr. Gale, Hull.

196. Vessel intended for the arctic expedition, with two screws amidships.

Proposed by Sir John Ross, and improvements suggested by Sir Samuel Brown, 1852.

197. Cruiser for the suppression of the slave trade on the coast of Africa, the paddle-wheels to be driven by a crank to be worked by manual labour.

Proposed by Commander Wilson, R.N.

198. Vessel showing a plan to arm ships' bows with an iron projection to pierce a ship's side; to fit pipes in connexion with the boilers, for discharging jets of steam on the deck of an enemy; to place a screw propeller on each side abaft, and to make the rudder on the balance principle.

Proposed by Mr. W. Joliffe, 1862.

DIVISION B.—Half-Models of Ships, arranged as in Division A.

LINE-OF-BATTLE SHIPS OF THREE DECKS.

201. The "VICTORY," 100 guns, (on a $\frac{1}{4}$ in. scale).
(For description see Class I., Division A., No. 12.)

202. The "COMMERCE DE MARSEILLES," 120 guns, (on a $\frac{1}{4}$ in. scale), length 208 ft. 4 in., breadth 54 ft. 9 $\frac{1}{2}$ in., depth 25 ft. 0 $\frac{1}{2}$ in., tonnage 2,747. Captured from the French at Toulon in 1793. Broken up at Devonport Yard 1802.

The armament was as follows :

		No.			Prs.
Lower deck	-	34	-	-	32
Middle "	-	34	-	-	24
Main "	-	34	-	-	12
Quarter "	-	14	-	-	12
Forecastle	-	4	-	-	12

120

203. The "SALVADOR DEL MUNDI," 112 guns, (on a $\frac{1}{4}$ in. scale), length 190 ft. 9 in., breadth 54 ft. $3\frac{1}{2}$ in., depth 23 ft. $1\frac{1}{2}$ in., tonnage 2,398. Captured from the Spaniards in 1797. Broken up at Plymouth in 1815.

The armament was as follows :

		No.			Prs.
Lower deck	-	30	-	-	32
Middle "	-	32	-	-	24
Main "	-	32	-	-	12
Quarter "	-	12	-	-	9
Forecastle	-	6	-	-	9

112

204. The "CALEDONIA," 120 guns, (on a $\frac{1}{4}$ in. scale).
(For description see Class I., Division A., No. 22.)

205. The "QUEEN," 110 guns, (on a $\frac{1}{4}$ in. scale).
(For description see Class I., Division A., No. 23.)

206. The "DUKE OF WELLINGTON," 131 guns, 700 horse power (on a $\frac{1}{4}$ in. scale), length 240 ft. 7 in., breadth 60 ft. 1 in., depth 24 ft. 8 in., tonnage 3,771. Laid down at Pembroke Yard, in 1849, as a sailing vessel, but converted to a screw ship while on the stocks. Launched in 1852. The original design for a sailing vessel, and the subsequent alterations of it for the screw propeller were by the Surveyor's Department.

		No.		Prs.		Weight.		Length.
						cwt.		ft. in.
Lower deck	-	10	-	8-in.	-	65	-	9 0
" "	-	26	-	32-prs.	-	56	-	9 6
Middle "	-	30	-	32 "	-	56	-	9 6
" "	-	6	-	8-in.	-	65	-	9 0
Main "	-	38	-	32-prs.	-	42	-	8 0
Upper "	-	20	-	32 "	-	25	-	6 0
" "	-	1	-	68-pr. pivot	-	95	-	10 0

131

The complement of men was 1,100.

The model and the above dimensions represent the ship as she was actually built.

207. The "MARLBOROUGH," 131 guns, 800 horse-power (on a $\frac{1}{4}$ in. scale), length 245 ft. 6 in., breadth 61 ft. 2½ in., depth 25 ft. 10 in., tonnage 4,000. Laid down at Portsmouth Yard, 1st September 1850, as a sailing vessel.

Conversion to a screw ship commenced 29th November 1852; launched as such 31st July 1855.

The original design for a sailing vessel and the subsequent alteration of it for the screw propeller were by the Surveyor's Department.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower deck	- 10	- 8-in.	- 65	- 9 0
" "	- 26	- 32-prs.	- 56	- 9 6
Middle "	- 6	- 8-in.	- 65	- 9 0
" "	- 30	- 32-prs.	- 56	- 9 6
Main "	- 38	- 32 "	- 42	- 8 0
Upper "	- 20	- 32 "	- 25	- 6 0
" "	- 1	- 68-pr. pivot	95	- 10 0

131

Complement of men 1,100.

The model and the above dimensions represent the ship as she was actually built.

208. The "VICTORIA," 121 guns, 1,000 horse-power (on a $\frac{1}{4}$ in. scale), length 260 ft. 2 in., breadth 60 ft. 1 in., depth 26 ft. 10 in., tonnage 4,127. Laid down at Portsmouth Yard 1st April 1856, launched 12th November 1859.

Designed by Surveyor's Department.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower Deck	- 32	- 8-in.	- 65	- 9 0
Middle "	- 30	- 8 "	- 65	- 9 0
Main "	- 32	- 32-prs.	- 58 or 56	- 9 6
Upper "	- 26	- 32 "	- 42	- 8 0
" "	- 1	- 68-pr. pivot	95	- 10 0

121

The complement of men was 1,130.

LINE-OF-BATTLE SHIPS OF TWO DECKS.

211. The "ALGESIRAS" (on a $\frac{1}{4}$ in. scale), 74-gun ship. Captured from the Spaniards.

212. The "GIBRALTAR," 80 guns, (on a $\frac{1}{4}$ in. scale), length 178 ft. 10 $\frac{3}{4}$ in., breadth 53 ft. 3 $\frac{3}{4}$ in., depth 22 ft. 4 in., tonnage 2,185. Was the Spanish ship of war "PHŒNIX," taken by Admiral Rodney, 16th January 1780, off Cape St. Vincent. She was launched in 1751. She was broken up at Pembroke Yard in November 1836.

The armament was as follows :

	No.	Prs.
Lower deck	30	24
Main „	32	24
Quarter „	12	9
Forecastle	6	9
	80	

The complement of men was 650.

213. The "SANS PAREIL," 80 guns, (on a $\frac{1}{4}$ in. scale), length 193 ft., breadth 51 ft. 6 in., depth 23 ft. 4 in., tonnage 2,242. Captured from the French, on 1st June 1794, by the British fleet under Earl Howe. Broken up at Devonport Yard in 1842.

The armament was as follows :

	No.	Prs.
Lower deck	30	32
Main „	32	24
Quarter „	2	24
„ „	14	32 carronades.
Forecastle	2	24
	80	

214. The "FOUDROYANT," 80 guns, (on a $\frac{1}{4}$ in. scale). (For description, see Class I., Division A., No. 54.)

215. The "BULWARK," 74 guns, (on a $\frac{1}{4}$ in. scale), length 181 ft. 10 in., breadth 49 ft. 3 in., depth 20 ft. 7 in., tonnage 1,940. Laid down at Portsmouth Yard 1804, launched in 1807, broken up at Portsmouth Yard in 1826.

Designed by Sir Wm. Rule.

Her armament was as follows :

		No.		Prs.
Lower deck	-	28	-	32
Main "	-	30	-	24
Quarter "	-	14	-	9
Forecastle	-	2	-	9
		<hr/> 74		

Complement of men was 590.

216. The "HERCULES," 80 guns, (on a $\frac{1}{4}$ in. scale), length 176 ft. 1 in., breadth 48 ft. $4\frac{1}{4}$ in., depth 21 ft., tonnage 1,750. Laid down at Chatham Yard in 1812, launched in 1815.

Designed by Surveyor of the Navy's Department with her topsides similar to the "RAMILLIES," launched in the River Thames in 1785.

The armament was as follows :

		No.		Prs.
Lower deck	-	28	-	32
Main "	-	28	-	18
Quarter "	-	4	-	12
" "	-	10	-	32 carronades.
" "	-	6	-	18 "
Forecastle	-	2	-	12
"	-	2	-	32 "
		<hr/> 80		

Complement of men was 590.

217. The "CUMBERLAND," 70 guns, (on a $\frac{1}{4}$ in. scale). (For description, see Class I., Division A., No. 58.)

218. The "SUPERB," 80 guns, (on a $\frac{1}{4}$ in. scale), length 190 ft., breadth 57 ft., depth 23 ft. 4 in., tonnage 2,583. Laid down at Pembroke Yard in 1838, launched in 1842.

Designed by Sir William Symonds.

There were also built on the same lines the "COLLINGWOOD," at Pembroke in 1841, the "COLOSSUS," at Pembroke in 1848; the "LION," at Pembroke in 1847; the "CENTURION," at Pembroke in 1844; and the "MEEANEE," at Bombay in 1848.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower deck	- 20	- 32	- 56	- 9 6
" "	- 8	- 8-in.	- 65	- 9 0
Main "	- 24	- 32-prs.	- 50	- 9 0
" "	- 4	- 8-in.	- 65	- 9 0
Upper "	- 24	- 32-prs.	- 41	- 8 0
	<hr/> 80			

Complement of men 720.

219. "LE JEMMAPES," 106 guns, (on a $\frac{1}{4}$ in. scale). French ship of about the year 1840.

220. "LE VALMY," 100 guns, (on a $\frac{1}{4}$ in. scale). French ship of about the year 1840.

221. The "ALBION," 90 guns, (on a $\frac{1}{4}$ in. scale), length 204 ft., breadth 60 ft. $2\frac{1}{4}$ in., depth 23 ft. 8 in., tonnage 3,111. Laid down at Devonport Yard, 13th August 1839, launched 6th September 1842.

Designed by Sir William Symonds.

There was also built on the same lines the "ABOUKIR," at Devonport, 1848.

The armament was as follows :

	No.	Prs.	Weight.
			cwt.
Lower deck	- 28	- 32	- 56
" "	- 4	- 68	- 112
Main "	- 26	- 32	- 56
" "	- 6	- 8-in.	- 65
Quarter "	- 16	- 32	- 42
" "	- 2	- 8-in.	- 52
Forecastle	- 8	- 32	- 42
	<hr/> 90		

She was converted to a screw ship in 1861, at Devonport, but the model and above dimensions are as she was built for a sailing ship.

222. The "AGAMEMNON," 80 guns, (on a $\frac{1}{4}$ in. scale), length 195 ft., breadth 54 ft. 8 in., depth 23 ft. 9 in., tonnage 2,497.

Designed by Rear-Admiral Hayes.

On the 14th March 1842, the "AGAMEMNON" was ordered to be built on a design furnished by Admiral

Hayes, but in consequence of the introduction of steam, the construction of this vessel was not commenced.

223. The "SANS PAREIL," 84 guns, (on a $\frac{1}{4}$ in. scale), length 193 ft., breadth 52 ft. 1 in., depth 22 ft. 8 in., tonnage 2,242. Laid down at Devonport Yard in 1845.

Designed by Sir William Symonds on the lines of the

"SANS PAREIL," captured from the French in 1794.

The armament was as follows :

	No.	Prs.		Weight.		Length.	
				wt.		ft.	in.
Lower deck	6	8-in.	-	65	-	9	0
" "	24	32-prs.	-	56	-	9	6
Main "	2	8-in.	-	65	-	9	0
" "	30	32-prs.	-	48	-	8	0
Upper "	6	32 "	-	42	-	8	0
" "	16	32 "	-	17	carronades.		
				84			

This vessel was never launched as a sailing ship, but in 1848 was ordered to be converted to a screw ship, and was launched as such in 1851.

The model and above dimensions are as designed for a sailing ship, but a model of her as launched will be found at No. 229 in this Division.

224. The "CRESSY," 80 guns, (on a $\frac{1}{4}$ in. scale), length 198 ft. 5 in., breadth 55 ft., depth 21 ft. 8 $\frac{1}{4}$ in., tonnage 2,538. Laid down at Chatham Yard in 1846.

Designed by Messrs. Read, Chatfield, and Creuze.

The armament was as follows :

	No.	Prs.		Weight.		Length.	
				wt.		ft.	in.
Lower deck	10	8-in.	-	65	-	9	0
" "	18	32-prs.	-	56	-	9	6
Main "	4	8-in.	-	65	-	9	0
" "	24	32-prs.	-	50	-	9	0
Upper "	24	32 "	-	42	-	8	0
				80			

The complement of men was 750.

This vessel was never launched as a sailing ship, but in 1852 was ordered to be converted to a screw ship, and was launched as such in 1853.

The model and above dimensions are as designed for a sailing ship.

225. The "CÆSAR," 90 guns, (on a $\frac{1}{4}$ in. scale), length 207 ft. 4 in., breadth 56 ft. $0\frac{3}{4}$ in., depth 23 ft. 4 in., tonnage 2,761. Laid down at Pembroke Yard in 1848.

Designed by the Committee of Reference.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower deck -	32	8-in.	65	9 0
Main „ -	34	32-prs.	56	9 6
Upper „ -	24	32 „	42	8 0
	90			

The complement of men was 820.

This vessel was never launched as a sailing ship, but in 1852 was ordered to be converted to a screw ship, and was launched as such in 1853.

The model and above dimensions are as designed for a sailing ship.

226. The "HANNIBAL," 90 guns, (on a $\frac{1}{4}$ in. scale), length 208 ft., breadth, 58 ft., depth 24 ft., tonnage 2,966. Laid down at Deptford Yard in 1848.

Designed by Mr. J. Edye, Assistant Surveyor of the Navy.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower deck -	32	8-in.	65	9 0
Main „ -	34	32-prs.	56	9 6
Upper „ -	24	32 „	42	8 0
	90			

The complement of men was 820.

This vessel was never launched as a sailing ship, but was lengthened and adapted for a screw ship (450 horse-power) by Mr. J. Edye, and launched as such in 1854.

The model and the above dimensions represent the vessel as she was designed for a sailing ship, but a model of her as launched will be found at No. 231 in this Division.

227. The "HOOD," 80 guns, (on a $\frac{1}{4}$ in. scale), length 198 ft., breadth 55 ft. 9 in., depth 23 ft. 4 in., tonnage 2,600. Laid down at Chatham Yard in 1849.

Designed by Surveyor's Department.

The armament was as follows :

		No.	Prs.	Weight.	Length.
				— cwt.	— ft. in.
Lower deck	-	10	- 8-in.	- 65	- 9 0
" "	-	18	- 32-prs.	- 56	- 9 6
Main "	-	4	- 8-in.	- 65	- 9 0
" "	-	24	- 32-prs.	- 50	- 9 0
Upper "	-	24	- 32 "	- 42	- 8 0
		80			

The complement of men was 750.

This vessel was never launched as a sailing ship, but was lengthened and adapted for a screw ship (600 horse-power) by the Surveyor's Department, and launched as such in 1859.

The model and the above dimensions represent the vessel as designed for a sailing ship.

228. Design for a 90-gun screw steamer.

Proposed about the year 1848, but not adopted.

229. The "SANS PAREIL," 80 guns, 350 horse-power, (on a $\frac{1}{4}$ in. scale), length 200 ft., breadth 52 ft. 3 in., depth 22 ft. 8 in., tonnage 2,339. Laid down at Devonport Yard in September 1845 as a sailing ship. Conversion to a screw ship commenced in January 1849; launched as such in March 1851.

Designed by Sir Wm. Symonds as a sailing ship, and adapted for the screw, by the Surveyor's Department.

The armament was as follows :

		No.	Prs.	Weight.	Length.
				— cwt.	— ft. in.
Lower deck	-	30	- 32	- 56	- 9 6
Main "	-	30	- 8-in.	- 52	- 8 0
Upper "	-	18	- 32-prs.	- 25	- 6 0
" "	-	2	- 32 "	- 56	- 9 6
		80			

The complement of men was 700.

The model and the above dimensions represent the ship

as she was actually built, but a model of her as a sailing ship will be found at No. 223 in this Division.

230. The "PRINCESS ROYAL," 91 guns, 400 horse-power (on a $\frac{1}{4}$ in. scale), length 217 ft., breadth 58 ft. $1\frac{1}{2}$ in., depth 24 ft., tonnage 3,130. Laid down at Portsmouth Yard in February 1841 as a sailing ship. Commenced conversion to a screw ship in November 1852. Launched in June 1853.

Designed by Sir Wm. Symonds as a sailing ship, and adapted for the screw by the Surveyor's Department.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower deck	- 20	- 8-in.	- 65	- 9 0
" "	- 12	- 32-prs.	- 56	- 9 6
Main "	- 8	- 8-in.	- 65	- 9 0
" "	- 26	- 32-prs.	- 56	- 9 6
Upper "	- 24	- 32-prs.	- 42	- 8 0
" "	- 1	- 68-pr. pivot	95	- 10 0
	<hr/> 91			

The complement of men was 840.

The model and the above dimensions represent the ship as she was actually built.

231. The "HANNIBAL," 91 guns, 450 horse-power (on a $\frac{1}{4}$ in. scale), length 217 ft. 6 in., breadth 58 ft. $1\frac{1}{2}$ in., depth 23 ft. $11\frac{1}{2}$ in., tonnage 3,136. Laid down at Deptford Yard in December 1848 as a sailing ship. Commenced conversion to a screw ship in October 1852, and launched in January 1854.

Designed by Mr. J. Edye.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower deck	- 20	- 8-in.	- 65	- 9 0
" "	- 12	- 32-prs.	- 56	- 9 6
Main "	- 8	- 8-in.	- 65	- 9 0
" "	- 26	- 32-prs.	- 56	- 9 6
Upper "	- 24	- 32-prs.	- 42	- 8 0
" "	- 1	- 68-pr. pivot	95	- 10 0
	<hr/> 91			

The complement of men was 850.

The model and the above dimensions represent the ship

234. The "ST. JEAN D'ACRE," 101 guns, 600 horse-power (on a $\frac{1}{4}$ in. scale), length 238 ft., breadth 55 ft. 4 in., depth 24 ft. 5 in., tonnage 3,199. Laid down at Devonport Yard in June 1851, launched 23rd March 1853.

Designed by the Surveyor's Department.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower deck	20	8-in.	65	9 0
" "	16	32-prs.	56	9 6
Main "	28	32 "	56	9 6
" "	8	8-in.	65	9 0
Upper "	28	32-prs.	42	8 0
" "	1	68-pr. pivot	95	10 0
<hr/>				
101				

The complement of men was 900.

235. The "RENOWN," 91 guns, 800 horse-power (on a $\frac{1}{4}$ in. scale), length 244 ft. 10 in., breadth 55 ft. 4 in., depth 24 ft. 9 in., tonnage 3,319. Laid down at Chatham Yard in December 1854, launched 28th March 1857.

Designed by Surveyor's Department on the "AGAMEMNON'S" lines, lengthened amidships to receive 800 horse-power engines.

There were also built on the same lines the "ANSON," at Woolwich in 1860, the "ATLAS," at Chatham in 1860, and the "REVENGE," at Pembroke in 1859.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower deck	34	8-in.	65	9 0
Main "	34	32-prs.	56 or 58	9 6
Upper "	22	32 "	45	8 6
" "	1	68-pr. pivot	95	10 0
<hr/>				
91				

The complement of men was 860.

236. The "REVENGE," 91 guns, 800 horse-power (on a $\frac{1}{4}$ in. scale), length 244 ft. 9 in., breadth 55 ft. 4½ in., depth 24 ft. 6 in., tonnage 3,322. Laid down at Pembroke Yard in January 1855, launched in April 1859.

Designed by the Surveyor's Department.

There were also built on the same lines the "RENOWN,"

at Chatham in 1857, the "ANSON," at Woolwich in 1860, and the "ATLAS," at Chatham in 1860.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower deck	34	8-in.	65	9 0
Main	34	32-prs.	58 or 56	9 6
Upper	22	32 "	45	8 6
"	1	68-pr. pivot	95	10 0
	91			

The complement of men was 860.

237. The "DUNCAN," 101 guns, 800 horse-power (on a $\frac{1}{4}$ in. scale), length 252 ft. 1 in., breadth 58 ft. 1 in., depth 25 ft. 6 $\frac{1}{2}$ in., tonnage 3,727. Laid down at Portsmouth Yard in May 1857, launched December 1859.

Designed by the Surveyor's Department.

There was also built on the same lines the "GIBALTAR," at Devonport in 1860.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower deck	38	8-in.	65	9 0
Main	38	32-prs.	58 or 56	9 6
Upper	24	32 "	42	8 0
"	1	68-pr. pivot	95	10 0
	101			

The complement of men was 900.

FRIGATES.

250. The "MEDEA," 38 guns, (on a $\frac{1}{4}$ in. scale). Captured from the Spaniards.

251. The "PRUEBA," 38 guns, (on a $\frac{1}{4}$ in. scale). Captured from the Spaniards.

252. The "SANTA MONICA," 44 guns, (on a $\frac{1}{4}$ in. scale), length 145 ft. 0 $\frac{1}{2}$ in., breadth 38 ft. 8 in., depth 11 ft. 10 in., tonnage 956. Captured from the Spanish in 1779 by

H.M.S. "PEARL." Struck on a rock and lost 1st April 1782, near Norman's Island, one of the keys of the Virgin Islands.

The armament was as follows :

		No.			Prs.
Main deck	-	26	-	-	12
Upper "	-	10	-	-	6
" "	-	8	-	-	18-pr. carronades.
<hr/>					
44					

The complement of men was 255.

253. The "SANTA MARGARITTA," 36 guns, (on a $\frac{1}{4}$ in. scale), length 145 ft. 6 in., breadth 38 ft. $10\frac{1}{2}$ in., depth 11 ft. $8\frac{1}{2}$ in., tonnage 993. Captured from the Spaniards in 1780.

The armament was as follows :

		No.			Prs.
Main deck	-	26	-	-	12
Quarter "	-	8	-	-	6
Forecastle	-	2	-	-	6
<hr/>					
36					

The complement of men was 255.

254. The "L'ESPION," late "ATALANTA," 32 guns, (on a $\frac{1}{4}$ in. scale), length 147 ft. 10 in., breadth 38 ft. $10\frac{1}{2}$ in., tonnage 986. Captured from the French in 1794.

The armament was as follows :

		No.			Prs.
Main deck	-	26	-	-	12
Quarter "	-	4	-	-	6
Forecastle	-	2	-	-	6
<hr/>					
32					

The complement of men was 215.

255. The "CAMBRIAN," 48 guns, (on a $\frac{1}{4}$ in. scale), length 154 ft., breadth 41 ft. 3 in., depth 14 ft., tonnage 1,160. Built by contract by Mr. Parsons. Laid down at Bursledon in 1795, launched in 1797, lost in the Mediterranean in 1828.

Designed by Sir John Henslow.

The armament was as follows :

	No.	Prs.
Main deck	28	18
Quarter „	2	9
„ „	12	32-pr. carronades.
Forecastle	4	9
„	2	32-pr. carronades.
	48	

The complement of men was 320.

256. The "FISGUARD," late "RESISTANCE," 46 guns, (on a $\frac{1}{4}$ in. scale), length 160 ft. 6 in., breadth 40 ft. 8 $\frac{1}{2}$ in., depth 13 ft. 3 $\frac{1}{2}$ in., tonnage 1,182. Captured from the French in 1797, sold in 1814.

The armament was as follows :

	No.	Prs.
Main deck	28	18
Quarter „	8	9
„ „	6	32-pr. carronades.
Forecastle	2	9
„	2	32-pr. carronades.
	46	

The complement of men was 284.

257. The "L'EGYPTIENNE," 48 guns, (on a $\frac{1}{4}$ in. scale), length 170 ft. 2 in., breadth 43 ft. 7 in., depth 15 ft. 6 in., tonnage 1,430. Captured from the French in the harbour of Alexandria in 1801, sold in April 1817.

The armament was as follows :

	No.	Prs.
Main deck	28	24
Quarter „	2	9
„ „	12	32-pr. carronades.
Forecastle	2	9
„	4	32-pr. carronades.
	48	

The complement of men was 330.

258. The "EURYALUS," 42 guns, (on a $\frac{1}{4}$ in. scale), length 145 ft. 2 in., breadth 38 ft. 2 $\frac{1}{2}$ in., depth 13 ft. 3 in., tonnage 946. Laid down by Mr. Adams at Bucklershard Yard in 1801, launched in 1803, sold at Gibraltar in 1860.

Designed by Sir Wm. Rule.

The armament was as follows :

		No.		Prs.
Main deck	-	26	-	18
Quarter „	-	2	-	9
„ „	-	10	-	32-pr. carronades.
Forecastle	-	4	-	32 „
		42		

The complement of men was 264.

259. The “LIVELY,” 46 guns, (on a $\frac{1}{4}$ in. scale), length 154 ft. 1 in., breadth 39 ft. 6 in., depth 13 ft. 6 in., tonnage 1,076. Laid down at Woolwich Yard in 1801, launched in 1804, lost in 1810. Designed by Sir Wm. Rule.

The armament was as follows :

		No.		Prs.
Main deck	-	28	-	18
Quarter „	-	2	-	9
„ „	-	12	-	32-pr. carronades.
Forecastle	-	2	-	9
„	-	2	-	32-pr. carronades.
		46		

The complement of men was 284.

260. The “BARBADOES,” (was the “BRAVE”), 36 guns, (on a $\frac{1}{4}$ in. scale), length 140 ft., breadth 36 ft. 7 in., depth 16 ft., tonnage 800. Captured from the French in 1804, wrecked in 1812.

The armament was as follows :

		No.		Prs.
Main deck	-	24	-	9
Quarter „	-	8	-	24-pr. carronades.
Forecastle	-	2	-	6
„	-	2	-	24-pr. carronades.
		36		

The complement of men was 195.

261. The “PSYCHE,” 32 guns, (on a $\frac{1}{4}$ in. scale), tonnage 848. Captured from the French in 1806, sold at Ferrol in 1812.

262. The “CHESAPEAKE,” 48 guns, (on a $\frac{1}{4}$ in. scale), length 151 ft., breadth 40 ft. 11 in., depth 13 ft. 9 in., ton-

nage 1,135. Captured from the Americans in 1813, sold in 1819.

The armament was as follows:

	No.	Prs.
Main deck	28	18
Quarter „	14	32-pr. carronades.
Forecastle	2	9
„	4	32-pr. carronades.
	48	

The complement of men was 315.

263. The "PRESIDENT," 50 guns, (on a $\frac{1}{4}$ inch scale), length 173 ft. 3 in., breadth 44 ft. 4 in., depth 13 ft. 11 in., tonnage 1,533. Captured from the Americans on the 15th January 1815, by the "ENDYMION," 46 guns, Captain H. Hope. Broken up at Portsmouth in June 1818. She was a very fast ship.

264. The "JAVA," 60 guns, (on a $\frac{1}{4}$ in. scale), length 171 ft. 11 $\frac{1}{2}$ in., breadth 44 ft. 1 in., depth 14 ft. 3 in., tonnage 1,458. Laid down at Devonport Yard in May 1814, launched in Nov. 1815, broken up at Portsmouth in Nov. 1862.

Designed by Surveyor's Department.

The armament was as follows:

	No.	Prs.
Main deck	30	24
Upper „	2	24
„ „	28	42-pr. carronades.
	60	

The complement of men was 480.

265. The "RAINBOW," 28 guns, (on a $\frac{1}{4}$ in. scale), length 113 ft. 9 $\frac{1}{2}$ in., breadth 31 ft. 11 $\frac{1}{4}$ in., depth 8 ft. 8 $\frac{1}{2}$ in., tonnage 503. Laid down at Chatham Yard in April 1822, launched in November 1823, sold in November 1838.

Designed by Surveyor's Department.

The armament was as follows:

No.	Prs.
20	32 carronades.
6	18 „
2	9
28	

The complement of men was 175.

266. The "VERNON," 50 guns, (on a $\frac{1}{4}$ scale), length 176 ft., breadth 52 ft. $8\frac{1}{2}$ in., depth 16 ft. 5 in., tonnage 2,082. Laid down at Woolwich yard in October 1831. launched in May 1832. Designed by Sir W. Symonds.

The armament was as follows:

	No.	Prs.	Weight.
			cwt.
Main deck	- 28 -	- 32 -	- 56
Quarter „	- 14 -	- 32 -	- 45
Forecastle	- 8 -	- 32 -	- 45
	50		

The complement of men was 450.

267. The "INCONSTANT," 36 guns, (on a $\frac{1}{4}$ in. scale), length 160 ft. 1 in., breadth 45 ft. 5 in., depth 13 ft. 7 in., tonnage, 1,422. Laid down at Portsmouth Yard in August 1834, launched in June 1836, sold in December 1862.

Designed by Captain Hayes.

The armament was as follows:

	No.	Prs.	Weight.	Length.
			cwt.	ft.
Main deck	- 22 -	- 32 -	- 56 -	- 9
Quarter „	- 10 -	- 32 -	- 25 -	- 6
Forecastle	- 4 -	- 32 -	- 25 -	- 6
	36			

The complement of men was 275.

268. The "CAMBRIAN," 36 guns, (on a $\frac{1}{4}$ in. scale), length 160 ft., breadth 48 ft. $9\frac{1}{2}$ in., depth 14 ft. $7\frac{1}{2}$ in., tonnage 1,625. Laid down at Pembroke Yard in August 1837, launched in July 1841.

Designed by Sir Wm. Symonds.

There were also built on the same lines the "ACTIVE," at Chatham in 1845; and the "SYBILLE," at Pembroke in 1847.

The armament was as follows:

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	- 18 -	- 32 -	- 56 -	- 9 6
" "	- 4 -	- 8-in. -	- 60 -	- 8 10
Upper „	- 14 -	- 32-prs. -	- 41 -	- 8 0
	36			

The complement of men was 275.

CLASS I.—DIVISION B.

269. The "SPARTAN," 26 guns, (on a $\frac{1}{4}$ in. scale), length 131 ft., breadth 40 ft. 7 $\frac{1}{2}$ in., depth 10 ft. 9 in., tonnage 918. Laid down at Devonport Yard in June 1838, launched in August 1841, sold in May 1862.

Designed by Sir Wm. Symonds.

The armament was as follows:

No.	Prs.	Weight.		Length.	
		— cwt.		ft.	in.
18	-	32	-	40	-
2	-	8-in.	-	50	-
6	-	32	-	25	-

26

The complement of men was 240.

270. The "EURYDICE," 26 guns, (on a $\frac{1}{4}$ in. scale), length 141 ft. 3 in., breadth 38 ft. 10 in., depth 8 ft. 9 in., tonnage 921. Laid down at Portsmouth Yard in April 1842, launched in May 1843.

Designed by Admiral the Honourable George Elliott.

The armament was as follows:

No.	Prs.	Weight.		Length.	
		— cwt.		ft.	in.
18	-	32	-	40	-
2	-	68	-	52	-
6	-	32	-	25	-

8 0 carronades.

26

The complement of men was 240.

271. The "RALEIGH," 50 guns, (on a $\frac{1}{4}$ in. scale), length 180 ft., breadth 50 ft. 1 in., depth 16 ft. 8 in., tonnage 1,939. Laid down at Chatham Yard in August 1842, launched in May 1845, lost on the China Station in 1857.

Designed by Mr. Fincham.

There was also built on the same lines the "SEVERN," at Chatham in 1856.

The armament was as follows:

	No.	Prs.	Weight.		Length.	
			— cwt.		ft.	in.
Main deck	22	32	56	-	9	6
" "	6	8-in.	65	-	9	0
Upper "	22	32-prs.	45	-	8	6

50

The complement of men was 500.

272. The "THETIS," 36 guns, (on a $\frac{1}{4}$ in. scale), length 164 ft. $7\frac{1}{4}$ in., breadth 46 ft. $8\frac{3}{4}$ in., depth 13 ft. $6\frac{1}{2}$ in., tonnage 1,533. Laid down at Devonport Yard in December 1844, launched in August 1846, exchanged in 1855 with the Prussian Government for two gun-boats.

Designed by Messrs. Read, Chatfield, and Creuze.
The armament was as follows:

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	- 18	- 32	- 56	- 9 6
" "	- 4	- 8-in.	- 60	- 8 10
Upper "	- 2	- 32-prs.	- 50	- 9 0
" "	- 12	- 32	- 25	- 6 0
	<hr/> 36			

The complement of men was 320.

273. The "CONSTANCE," 50 guns, (on a $\frac{1}{4}$ in. scale), length 180 ft., breadth 52 ft. $9\frac{1}{4}$ in., depth 16 ft. 4 in., tonnage 2,132. Laid down at Pembroke Yard in October 1843, launched in March 1846.

Designed by Sir Wm. Symonds.

There were also built on the same lines the "ARETHUSA," at Pembroke in 1849, and the "OCTAVIA," at Pembroke in 1849.

The armament was as follows:

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	- 6	- 8-in.	- 65	- 9 0
" "	- 22	- 32-prs.	- 56	- 9 6
Upper "	- 4	- 8-in.	- 65	- 9 0
" "	- 18	- 32-prs.	- 45	- 8 6
	<hr/> 50			

The complement of men was 500.

She was converted to a screw frigate of 51 guns and 500 horse-power in 1862 at Devonport, but the model and the above dimensions are as she was built for a sailing ship.

274. The "LEANDER," 50 guns, (on a $\frac{1}{4}$ in. scale), length 181 ft. $4\frac{1}{2}$ in., breadth 50 ft. 9 in., depth 15 ft. 8 in., tonnage 1,987. Laid down at Portsmouth Yard in February 1845, launched in March 1848.

Designed by Mr. Richard Blake, during the time of his being Master Shipwright at Portsmouth Yard.

The armament was as follows :

		No.	Prs.	Weight.	Length.	
				cwt.	ft.	in.
Main deck	-	6	-	8-in.	-	9 0
" "	-	22	-	22-prs.	-	9 6
Upper "	-	4	-	8-in.	-	9 0
" "	-	18	-	32-prs.	-	8 6
		<hr/>				
		50				

The complement of men was 500.

She was converted to a screw frigate of 51 guns and 400 horse-power in 1861 at Sheerness, but the model and the above dimensions are as she was built for a sailing ship.

275. The "PHAETON," 50 guns, (on a $\frac{1}{4}$ in. scale), length 184 ft. 11 in., breadth 49 ft. 5 $\frac{1}{4}$ in., depth 15 ft. 10 $\frac{1}{2}$ in., tonnage 1,942. Laid down at Deptford Yard in September 1845, launched in November 1848.

Designed by Mr. White.

The armament was as follows :

		No.	Prs.	Weight.	Length.	
				cwt.	ft.	in.
Main deck	-	6	-	8-in.	-	9 0
" "	-	22	-	32-prs.	-	9 6
Upper "	-	4	-	8-in.	-	9 0
" "	-	18	-	32-prs.	-	8 6
		<hr/>				
		50				

The complement of men was 500.

She was converted to a screw frigate of 51 guns and 400 horse-power in 1859 at Sheerness, but the model and the above dimensions are as she was built for a sailing ship.

276. The "DIAMOND," 28 guns, (on a $\frac{1}{4}$ in. scale), length 140 ft., breadth 42 ft. 2 in., depth 11 ft. 0 $\frac{1}{2}$ in., tonnage 1,055. Laid down at Sheerness Yard in July 1846, launched in August 1848.

Designed by Sir Wm. Symonds.

There were also built on the same lines the "NIOBE" at Devonport in 1849.

The armament was as follows :

No.			Prs.		Weight.
					cwt.
20	-	-	32	-	45
6	-	-	32	-	25
2	-	-	8-in.	-	56 pivots.
<hr/>					
28					

The complement of men was 240.

277. The "INDEFATIGABLE," 50 guns, (on a $\frac{1}{4}$ in. scale), length 180 ft., breadth 51 ft. 6 in., depth 16 ft. 6 in., tonnage 2,047. Laid down at Devonport Yard in August 1846, launched in July 1848.

Designed by Mr. W. Edye, Master Shipwright of the Dockyard.

There was also built on the same lines the "PHŒBE," at Devonport in 1854.

The armament was as follows :

	No.		Prs.		Weight.		Length.
					cwt.		ft. in.
Main deck	-	28	-	8-in.	-	65	- 9 0
Upper „	-	22	-	32-prs.	-	45	- 8 6
<hr/>							
50							

The complement of men was 500.

278. The "ARETHUSA," 50 guns, (on a $\frac{1}{4}$ in. scale), length 180 ft., breadth 52 ft. 8 $\frac{1}{2}$ in., depth 16 ft. 3 $\frac{3}{8}$ in., tonnage 2,127. Laid down at Pembroke Yard in January 1846, launched in June 1849.

Designed by Sir William Symonds.

There were also built on the same lines the "CONSTANCE," at Pembroke in 1846, and the "OCTAVIA," at Pembroke in 1849.

The armament was as follows :

	No.		Prs.		Weight.		Length.
					cwt.		ft. in.
Main deck	-	6	-	8-in.	-	65	- 9 0
„ „	-	22	-	32-prs.	-	56	- 9 6
Upper „	-	4	-	8-in.	-	65	- 9 0
„ „	-	18	-	32-prs.	-	45	- 8 6
<hr/>							
50							

The complement of men was 500.

She was converted to a screw frigate of 51 guns and 500 horse-power in 1861 at Chatham, but the model and the above dimensions are as she was built for a sailing ship.

279. The "NANKIN," 50 guns, (on a $\frac{1}{4}$ in. scale), length 185 ft., breadth 50 ft. 10 in., depth 15 ft. 10 $\frac{1}{2}$ in., tonnage 2,049. Laid down at Woolwich Yard in June 1846, launched in March 1850.

Designed by Mr. Oliver W. Lang.

The armament was as follows:

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	6	8 in.	65	9 0
" "	22	32 prs.	56	9 6
Upper "	4	8 in.	65	9 0
" "	18	32 prs.	45	8 6
	50			

The complement of men was 500.

280. The "EMERALD," 60 guns, (on a $\frac{1}{4}$ in. scale) length 185 ft., breadth 52 ft., depth 15 ft. 8 in., tonnage 2,147. Laid down at Deptford Yard in May 1849.

Designed by the Surveyor's Department.

The armament was as follows:

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	30	8-in.	65	9 0
Upper "	22	32-prs.	45	8 6
" "	8	32 "	40	8 0
	60			

The complement of men was 560.

This vessel was never launched as a sailing ship, but in 1854, was ordered to be converted to a screw ship, and was launched as such in 1856.

The model and the above dimensions are as designed for a sailing ship.

281. The "NARCISSUS," 50 guns, (on a $\frac{1}{4}$ in. scale,) length 180 ft., breadth 50 ft. 10 in., depth 15 ft. 10 in., tonnage 1,996. Laid down at Devonport Yard in November 1849.

Designed by Surveyor's Department.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	- 28	- 8-in.	65	- 9 0
Upper „	- 22	- 32-prs.	45	- 8 0
	<u>50</u>			

The complement of men was 500.

This vessel was never launched, but in consequence of the more general introduction of steam, her frame, in 1857, was taken down, and the material used in the construction of a screw frigate of the same name; but the model and the above dimensions are as she was designed for a sailing ship.

282. The "SAN FIORENZO," 50 guns, (on a $\frac{1}{4}$ in. scale), length 187 ft. 4 in., breadth 50 ft. 6 in., depth 15 ft. $6\frac{1}{2}$ in., tonnage 2,066. Laid down at Woolwich Yard in June 1850. Designed by Messrs. Read, Chatfield, and Creuze.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	- 28	- 8-in.	65	- 9 0
Upper „	- 22	- 32-prs.	45	- 8 6
	<u>50</u>			

The complement of men was 500.

This vessel was never built, but in consequence of the more general introduction of steam, her frame, in 1856, was taken down and the material used in the construction of some screw corvettes, &c.

283. The "BACCHANTE," 50 guns, (on a $\frac{1}{4}$ in. scale), length 187 ft. 4 in., breadth 50 ft. 6 in., depth 15 ft. $6\frac{1}{2}$ in., tonnage 2,066.

Designed by Messrs. Read, Chatfield, and Creuze, in 1849.

The armament was as follows :

	Nos.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	- 28	- 8-in.	65	- 9 0
Upper „	- 22	- 32-prs.	45	- 8 6
	<u>50</u>			

The complement of men was 500.

In consequence of the more general introduction of steam into the navy, the keel of this vessel was never laid, but the material provided for her was used in the construction of a screw steam ship of the same name.

234. The "RETRIBUTION," 10 guns, 400 horse-power paddle-wheel vessel (on a $\frac{1}{4}$ -in. scale), length 220 ft., breadth 40 ft. 6 in., depth 26 ft. 4 in., tonnage 1,641. Laid down at Chatham Yard in August 1842, launched in July 1844, sold in 1864. Designed by Sir W. Symonds.

The armament was as follows :

No.	Prs.	Weight.
2	8-in.	112 cwt.
4	8 "	65 "
4	32-prs.	25 "
10		

235. The "DAUNTLESS," 24 guns, 580 horse-power (on a $\frac{1}{4}$ -in. scale), length 219 ft. 6 in., breadth 39 ft. 9 in., depth 26 ft., tonnage 1,575. Laid down at Portsmouth Yard in September 1845, launched in January 1847. Designed by Mr. Fincham.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	18	32	56	9 6
Upper deck	2	68 pivot	95	10 0
" "	4	10-in.	85	9 4
	24			

The complement of men was 250.

She was originally constructed 9 ft. 6 in. shorter, but the model, and the above dimensions and armament represent her as she was, after being lengthened by the stern in 1850, an alteration which caused a very great improvement in her speed.

236. The "ARROGANT," 46 guns, 360 horse-power, (on a $\frac{1}{4}$ -in. scale), length 200 ft., breadth 45 ft. 8 $\frac{1}{2}$ in., depth 15 ft. 1 in., tonnage 1,872. Laid down at Portsmouth Yard in September 1845, launched in April 1848. Designed by Mr. Fincham.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	- 16	- 32	- 56	- 9 6
" "	- 12	- 8-in.	- 65	- 9 0
Upper "	- 16	- 32-prs.	- 32	- 6 6
" "	- 2	- 68 "	- 95	- 10 0
	<u>46</u>			

The complement of men was 450.

287. The "IMPERIEUSE," 51 guns, 360 horse-power, (on a $\frac{1}{4}$ -in. scale), length 212 ft., breadth 50 ft. $0\frac{1}{2}$ in., depth 16 ft. $8\frac{3}{4}$ in., tonnage 2,358. Laid down at Deptford Yard in November 1850, launched in September 1852.

Designed by Surveyor's Department.

There were also built on the same lines the "CHESAPEAKE," at Chatham in 1855, the "EURYALUS," at Chatham in 1853, and the "FORTE," at Deptford in 1858.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	- 8	- 8-in.	- 65	- 9 0
" "	- 22	- 32-prs.	- 56	- 9 6
Upper "	- 2	- 8-in.	- 65	- 9 0
" "	- 18	- 32-prs.	- 45	- 8 6
" "	- 1	- 68 " pivot	- 95	- 10 0
	<u>51</u>			

The complement of men was 530.

288. The "TRIBUNE," 31 guns, 300 horse-power, (on a $\frac{1}{4}$ -in. scale), length 192 ft., breadth 43 ft., depth 12 ft. 11 in., tonnage 1,569. Laid down at Sheerness Yard in April 1851, launched in January 1853.

Designed by Surveyor's Department.

There was also built on the same lines the "CURAÇOA," at Pembroke in 1854.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	- 20	- 32	- 56	- 9 6
Upper "	- 10	- 32	- 42	- 8 0
" "	- 1	- 10-in. pivot	- 85	- 9 4
	<u>31</u>			

The complement of men was 300.

289. The "EMERALD," 51 guns, 600 horse-power, (on a $\frac{1}{4}$ -in. scale), length 237 ft., breadth 52 ft. $6\frac{3}{4}$ in., depth 16 ft. 8 in., tonnage 2,913. Laid down at Deptford Yard in June

1849, as a sailing ship; conversion to a screw ship commenced in May 1854, launched as such in July 1856.

Designed by Surveyor's Department.

There was also built on the same lines the "MELPOMENE," at Pembroke in 1857.

The armament was as follows:

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	30	8-in.	65	9 0
Upper "	20	32-prs.	56	9 6
" "	1	68 " pivot	95	10 0
	51			

The complement of men was 560.

290. The "DIADEM," 32 guns, 800 horse-power, (on a $\frac{1}{4}$ -in. scale), length 240 ft., breadth 48 ft. 0 $\frac{1}{2}$ in., depth 16 ft. 7 in., tonnage 2,483. Laid down at Pembroke Yard in June 1855, launched in October 1856.

Designed by Surveyor's Department.

There was also built on the same lines the "DORIS," at Pembroke in 1857.

The armament was as follows:

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Upper deck	20	68	95	10 0
Main "	10	32	58 or 56	9 6
" "	2	68-pr. pivot	95	10 0
	32			

The complement of men was 475.

291. The "ARIADNE," 26 guns, 800 horse-power, (on a $\frac{1}{4}$ -in. scale), length 280 ft., breadth 50 ft. 0 $\frac{3}{4}$ in., depth 19 ft. 4 in., tonnage 3,214. Laid down at Deptford Yard in August 1856, launched in June 1859.

Designed by Surveyor's Department.

There was also built on the same lines the "GALATEA," at Woolwich in 1859.

The armament was as follows:

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	24	10-in.	84	9 4
Upper "	2	68-pr. pivots	95	10 0
	26			

The complement of men was 400.

292. The "ORLANDO," 50 guns, 1,000 horse-power, (on a $\frac{1}{4}$ -in. scale), length 300 ft., breadth 52 ft. 1 in., depth 19 ft. 10 in., tonnage 3,740. Laid down at Pembroke Yard in November 1856, launched in June 1858.

Designed by Surveyor's Department.

There was also built on the same lines the "MERSEY," at Chatham in 1858, but with an alteration in her ports to carry fewer guns

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft.
Main deck	38	8-in.	65	9
Upper „	12	68-pr. pivots	95	10
	50			

The complement of men was 560.

293. The "MERSEY," 40 guns, 1,000 horse-power, (on a $\frac{1}{4}$ -in. scale), length 300 ft. 2 $\frac{1}{4}$ in., breadth 52 ft., depth 19 ft. 11 in., tonnage 3,733. Laid down at Chatham Yard in December 1856, launched in August 1858.

Designed by Surveyor's Department.

There was also built on the same lines the "ORLANDO," at Pembroke in 1858, but with an alteration in her ports to carry more guns.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	28	10-in.	84	9 4
Upper „	12	68-pr. pivots	95	10 0
	40			

The complement of men was 560.

294. The "NEWCASTLE," 51 guns, 600 horse-power, (on a $\frac{1}{4}$ -in. scale), length 250 ft., breadth 52 ft., depth 19 ft. 2 in., tonnage 3,027. Laid down at Deptford Yard in December 1858, launched in October 1860.

Designed by Surveyor's Department.

There were also built on the same lines the "BRISTOL," at Woolwich in 1861, the "GLASGOW," at Portsmouth in 1861, and the "UNDAUNTED," at Chatham in 1861.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	- 30	- 8-in.	- 65	- 9 0
Upper "	- 20	- 32-prs.	- 58 or 56	9 6
" "	- 1	- 68-pr. pivot	95	10 0
	<u>51</u>			

CORVETTES, SLOOPS, BRIGS, &c.

300. The "GRANA," 28 guns (on a $\frac{1}{4}$ in. scale), length 117 ft. 10 in., breadth 31 ft. 11 $\frac{3}{4}$ in., depth 9 ft. 4 in., tonnage 528. Captured from the Spaniards on the 25th February 1781 by the "CERBERUS," 32 guns, Capt. Mann, off Cape Finisterre.

The armament was as follows :

No.	Prs.
<u>22</u>	- 6
6	- 4
<u>28</u>	

The complement of men was 180.

301. The "SOPHIE," 18 guns, (on a $\frac{1}{4}$ in. scale), length 108 ft. 8 in., breadth 28 ft. 11 in., depth 13 ft. 11 $\frac{1}{2}$ in., tonnage 388. Captured from the French in 1798. Broken up at Deptford in 1809.

The armament was as follows :

No.	Prs.
<u>16</u>	- 24 carronades.
2	- 6-prs.
<u>18</u>	

The complement of men was 120.

302. The "PORT MAHON," 18 guns, (on a $\frac{1}{4}$ in. scale), length, 91 ft. 5 $\frac{1}{2}$ in., breadth 25 ft. 2 in., depth 12 ft. 8 in., tonnage 277. Found building when Port Mahon surrendered, in 1798. Launched in 1799. Broken up at Woolwich in 1837.

The armament was as follows :

No.	Prs.
<u>18</u>	- 18

This vessel was employed as the Police Ship in the Thames from 1817 until 1837.

303. The "BOURDELOIS," 24 guns, (on a $\frac{1}{4}$ in. scale) length 138 ft. 6 in., breadth 31 ft. 9 in., depth 15 ft. 1 in., tonnage 625. Built at Nantes in 1799. Captured from the French in 1799. Broken up at Chatham in 1804.

The armament was as follows :

No.	Prs.
22 - - -	32 carronades.
2 - - -	9-prs.
24	

The complement of men was 195.

304. The "L'EPERVIER," 16 guns, (on a $\frac{1}{4}$ in. scale), length 95 ft. 1 in., breadth 28 ft. 6 in., depth 8 ft. $9\frac{1}{2}$ in., tonnage 315. Captured from the French in 1803. Broken up at Pembroke in 1814.

The armament was as follows :

No.	Prs.
16 - - -	6

The complement of men was 121.

305. The "NONPAREIL," (on a $\frac{1}{4}$ in. scale), tonnage 210. An American schooner of 12 guns ; 210 tons. Seized in 1808, and sold in 1813.

306. The "CADMUS," 10 guns, (on a $\frac{1}{4}$ in. scale), length 90 feet 3 in., breadth 24 ft. 6 in., depth 11 ft., tonnage 237. Built, by contract, by Mr. Dudman. Laid down in December 1807. Launched in February 1808. Sold in 1864.

Designed by Mr. Henry Peake.

There were also built on the same lines the "CHEROKEE" in the River Thames in 1808, the "JASPER" at Ipswich in 1808, &c.

The armament was as follows :

No.	Prs.
8 - - -	18 carronades.
2 - - -	6-prs.
10	

The complement of men was 76.

307. The "ANDROMEDA," late "HANNIBAL," 24 guns, (on a $\frac{1}{4}$ in. scale), length 129 ft. 7 in., breadth 37 ft. $5\frac{3}{8}$ in., depth 11 ft., tonnage 812. Built in Maryland in 1810. Captured from the Americans in 1812. Sold in 1816.

The armament was as follows:

No.	Prs.
22	32 carronades.
2	12-prs.
24	

The complement of men was 195.

308. The "TERROR," (on a $\frac{1}{4}$ in. scale), length 102 ft. 4 in., breadth 26 ft. 11 $\frac{1}{2}$ in., depth 12 ft. 11 $\frac{1}{2}$ in., tonnage 326. Commenced building by Mr. Davy at Topsham in 1812. Launched in 1813. Designed by Sir H. Peake.

This vessel was employed in arctic and antarctic expeditions. In 1845 she was fitted with a screw propeller, and sailed with Sir J. Franklin's expedition, from which she never returned.

309. The "FLORIDA," late "FROLIC," 20 guns, (on a $\frac{1}{4}$ in. scale), length 119 ft. 5 $\frac{1}{2}$ in., breadth 32 ft., depth 14 ft. 2 in., tonnage 539. Built at Charleston in 1813. Captured from the Americans in 1814. Broken up at Chatham in 1819.

The armament was as follows:

No.	Prs.
18	32 carronades.
2	9-prs.
20	

The complement of men was 135.

310. The "EDEN," 28 guns, (on a $\frac{1}{4}$ in. scale), length 108 ft. 6 in., breadth 30 ft. 8 in., depth 9 ft., tonnage 451. Built by contract by Mr. Courtney at Chester. Laid down in 1813. Launched in 1814. Broken up at Portsmouth in 1833. Designed by Sir W. Rule.

There were also built on the same lines the "MERSEY" at Chester in 1814, the "TYNE" at Topsham in 1814, &c.

The armament was as follows:

No.	Prs.
18	32 carronades.
8	12 "
2	6-prs.
28	

The complement of men was 150.

311. The "ROSE," 18 guns, (on a $\frac{1}{4}$ in. scale), length 104 ft. 4 in., breadth 29 ft. 10 in., depth 13 ft. 4 in., tonnage 398. Laid down at Portsmouth Yard in April 1820. Launched in June 1821. Broken up at Chatham in May 1851.

Designed by the "Superior Class of Shipwright Apprentices."

The armament was as follows :

No.	Prs.
16	32 carronades.
2	6-prs.
18	

The complement of men was 125.

312. The "CRUISER," 18 guns, (on a $\frac{1}{4}$ in. scale), length 100 ft., breadth 31 ft. 0 $\frac{3}{4}$ in., depth 12 ft. 9 $\frac{1}{2}$ in., tonnage 384. Laid down at Chatham Yard in January 1826. Launched in January 1828. Sold at Bombay in March 1849.

Designed on the lines of the "CRUISER," which was designed by Sir W. Rule, and launched at Ipswich in 1797, and by which design upwards of 100 others were constructed.

The armament was as follows :

No.	Prs.
16	32 carronades.
2	6-prs.
18	

The complement of men was 125.

313. The "LARNE," 18 guns, (on a $\frac{1}{4}$ in. scale), length 113 ft. 3 in., breadth 30 ft. 10 $\frac{1}{2}$ in., depth 8 ft., tonnage 463. Laid down at Pembroke Yard in July 1828. Launched in June 1829.

Designed by Professor Inman.

There were also built on the same lines, the "ORESTES" at Portsmouth in 1824; the "COMUS" at Pembroke in 1828, and the "ELECTRA" at Portsmouth in 1837.

The armament was as follows :

No.	Prs.
16	32 carronades.
2	9-prs.
18	

The complement of men was 125.

She was originally called "LIGHTNING," but in 1832 her name was changed to "LARNE."

314. The "PANTALON," 10 guns, (on a $\frac{1}{4}$ in. scale), length 91 ft. 10 $\frac{3}{4}$ in., breadth 29 ft. 4 $\frac{1}{4}$ in., depth 12 ft. 8 in., tonnage 323. Was the Duke of Portland's yacht. Purchased by the Admiralty in 1831. Broken up in 1852.

Designed by Sir Wm. Symonds.

The armament was as follows :

No.	Prs.
8 - - -	18 carronades.
2 - - -	6-prs.
10	

The complement of men was 68.

315. The "BONETTA," brigantine, 3 guns, (on a $\frac{1}{4}$ in. scale), length 90 ft. 8 in., breadth 29 ft. 3 $\frac{1}{2}$ in., depth 14 ft. 7 $\frac{3}{4}$ in., tonnage 319. Laid down at Sheerness Yard in October 1834. Launched in April 1836. Broken up at Deptford in April 1861. Designed by Sir Wm. Symonds.

There were also built on the same lines, the "DOLPHIN" at Sheerness in 1836; the "DART" at Sheerness in 1847, and the "SPY" at Sheerness in 1841.

The armament was as follows :

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
2 - - -	32 - - -	25 - - -	6 0
1 - - -	32 - - -	40 - - -	7 6
3			

The complement of men was 70.

316. MODEL of a design for a cutter, proposed by Sir William Symonds about the year 1836.

317. The "DAPHNE," 18 guns, (on a $\frac{1}{4}$ in. scale), length 120 ft., breadth 37 ft. 8 in., depth 18 ft., tonnage 726. Laid down at Pembroke Yard in December 1835. Launched in August 1838. Designed by Sir Wm. Symonds.

There was also built on the same lines the "DIDO" at Pembroke in 1836.

The armament was as follows :

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
18 - - -	32 - - -	40 - - -	7 6
18			

The complement of men was 148.

318. The "PILOT," 16 guns, (on a $\frac{1}{4}$ in. scale), length 105 ft. $0\frac{1}{2}$ in., breadth 33 ft. 6 in., depth 14 ft. 10 in., tonnage 485. Laid down at Devonport Yard in August 1837. Launched in June 1838. Sold in January 1862.

Designed by Sir Wm. Symonds.

The armament was as follows :

No.	Prs.	Description.
12	32	17 cwt. carronades.
4	32	25 cwt., 6 ft.
16		

The complement of men was 130.

319. The "SIREN," 16 guns, (on a $\frac{1}{4}$ in. scale), length 110 ft., breadth 34 ft. 10 in., depth 14 ft. 10 in., tonnage 549. Laid down at Woolwich Yard in June 1839. Launched in April 1841. Designed by Sir Wm. Symonds.

There were also built on the same lines, the "HELENA" at Pembroke in 1843; the "JUMNA" at Bombay in 1848; the "ATALANTA" at Pembroke in 1847, &c.

The armament was as follows :

No.	Prs.	Weight.	Length.
16	32	25 cwt.	6 ft. in.
16			

The complement of men was 130.

320. The "FLYING FISH," 12 guns, (on a $\frac{1}{4}$ in. scale), length 103 ft. 1 in., breadth 32 ft. $4\frac{1}{2}$ in., depth 14 ft. $4\frac{1}{2}$ in., tonnage 445. Laid down at Pembroke Yard in October 1843. Launched in April 1844. Broken up at Portsmouth in August 1852.

Designed by Sir Wm. Symonds.

There was also built on the same lines the "KINGFISHER" at Pembroke in 1845.

The armament was as follows :

No.	Prs.	Weight.
10	32	25 cwt.
2	18	20
12		

The complement of men was 130.

321. The "MUTINE," 12 guns, (on a $\frac{1}{4}$ in. scale), length 111 ft. 11 $\frac{1}{2}$ in., breadth 31 ft. 11 in., depth 13 ft. 7 in., tonnage 428. Laid down at Chatham Yard in October 1843. Launched in April 1844. Lost in 1848.

Designed by Mr. Fincham.

The armament was as follows :

No.	Prs.	Weight.
		cwt.
10	32	25
2	18	20
12		

The complement of men was 130.

322. The "DARING," 12 guns, (on a $\frac{1}{4}$ in. scale), length 104 ft., breadth 31 ft. 4 $\frac{1}{2}$ in., depth 15 ft. 5 $\frac{1}{2}$ in., tonnage 426. Laid down at Portsmouth Yard in October 1843. Launched in April 1844. Designed by Mr. Joseph White.

The armament was as follows :

No.	Prs.	Weight.
		cwt.
10	32	25
2	18	20
12		

The complement of men was 130.

323. The "OSPREY," 12 guns, (on a $\frac{1}{4}$ in. scale), length 101 ft. 6 in., breadth 31 ft. 10 $\frac{1}{2}$ in., depth 13 ft. 10 in., tonnage 425. Laid down at Portsmouth Yard in November 1843. Launched in April 1844. Wrecked off Hokianga on 11th March 1846.

Designed by Mr. Blake.

The armament was as follows :

No.	Prs.	Weight.
		cwt.
10	32	25
2	18	20
12		

The complement of men was 130.

324. The "ESPIEGLE," 12 guns, (on a $\frac{1}{4}$ in. scale), length 104 ft. 8 in., breadth 31 ft. 9 $\frac{1}{2}$ in., depth 13 ft. 1 $\frac{1}{4}$ in., ton-

nage 443. Laid down at Chatham Yard in January 1844. Launched in April 1844. Sold in November 1861.

Designed by Messrs. Read, Chatfield, and Creuze.

The armament was as follows:

No.	Prs.	Weight.
		cwt.
10 - - -	32 - -	25
2 - - -	18 - -	20
<hr/> 12		

The complement of men was 130.

325. MODEL (on a $\frac{1}{4}$ in. scale) of a design for a corvette, proposed by Captain Fishbourne, about the year 1845.

326. The "ARACHNE," 18 guns, (on a $\frac{1}{4}$ in. scale), length 115 ft., breadth 35 ft. $5\frac{1}{2}$ in., depth 16 ft. 10 in., tonnage 602. Laid down at Devonport Yard in October 1845. Launched in March 1847.

Designed by Sir Wm. Symonds.

There was also built on the same lines the "TERPSICHORE" at Blackwall in 1847.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
2 - - -	32 - -	39 - -	7 6
16 - - -	32 - -	25 - -	6 0
<hr/> 18			

The complement of men was 145.

327. The "BRITOMART," 8 guns, (on a $\frac{1}{4}$ in. scale), length 93 ft., breadth 29 ft. $3\frac{3}{4}$ in., depth 13 ft. $5\frac{1}{2}$ in., tonnage 330. Laid down at Pembroke Yard in May 1846. Launched in June 1847. Designed by Sir Wm. Symonds.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
8 - - -	18 - -	15 - -	5 6
<hr/> 8			

The complement of men was 80.

328. The "RATTLER," 5 guns, 200 horse-power, (on a $\frac{1}{4}$ in. scale), length 176 ft. 6 in. breadth 32 ft. $8\frac{1}{2}$ in., depth

18 ft. $7\frac{1}{2}$ in., tonnage 888. Laid down at Sheerness Yard in April 1842. Launched in April 1843. Broken up at Woolwich in November 1856.

Designed by Sir Wm. Symonds, as "ARDENT," lengthened aft for the screw propeller.

The armament was as follows:

No.	Prs.
4	32 carronades.
1	68-pr. pivot, 65 cwt., 9 ft. 0 in.
5	

The complement of men was 120.

329. The "REYNARD," 8 guns, 60 horse-power, (on a $\frac{1}{4}$ in. scale), length 147 ft. 8 in., breadth 27 ft. $9\frac{3}{4}$ in., depth 14 ft. $6\frac{1}{2}$ in., tonnage 516. Laid down at Deptford Yard in August 1847. Launched in August 1848. Lost in 1851.

Designed by Mr. John Edye.

The armament was as follows:

No.	Prs.	Weight.
		cwt.
6	32	25
2	32 pivot.	
8		

The complement of men was 100.

330. The "ARCHER," 14 guns, 202 horse-power, (on a $\frac{1}{4}$ in. scale), length 186 ft. $4\frac{1}{2}$ in., breadth 33 ft. $10\frac{1}{2}$ in., depth 18 ft. 11 in., tonnage 973. Laid down at Deptford Yard in October 1847. Launched in March 1849.

Designed by Surveyor's Department.

There was also built on the same lines the "WASP" at Deptford in 1850.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
12	32	42	6 6
2	68 pivot	87	9 6
14			

The complement of men was 150.

331. The "BRISK," 15 guns, 250 horse-power, (on a $\frac{1}{4}$ in. scale), length 190 ft. $7\frac{1}{4}$ in., breadth 35 ft. $2\frac{1}{4}$ in.,

depth 18 ft. 2 in., tonnage 1,087. Laid down at Woolwich Yard in January 1849. Launched in June 1851.

Designed by the Committee of Reference.

The armament was as follows :

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
14 -	- 32	- 32	- 6 6
1 -	- 68-pr. pivot	- 87	- 9 6
<hr/>			
15			

The complement of men was 170.

332. The "HIGHFLYER," 21 guns, 250 horse-power, (on a $\frac{1}{4}$ in. scale), length 192 ft., breadth 36 ft. $5\frac{1}{2}$ in., depth 22 ft. $8\frac{1}{2}$ in., tonnage 1,161. Built by contract by Messrs. Mare and Co. at Blackwall. Laid down in January 1850. Launched in August 1851.

Designed by Surveyor's Department.

There was also built on the same lines the "ESK" at Millwall in 1854.

The armament was as follows :

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
20 -	- 8-in.	- 52	- 8 0
1 -	- 10-in. pivot	- 85	- 9 4
<hr/>			
21			

The complement of men was 220.

333. The "CRUISER," 17 guns, 60 horse-power, (on a $\frac{1}{4}$ in. scale), length 160 ft., breadth 31 ft. $10\frac{1}{2}$ in., depth 17 ft. $4\frac{3}{4}$ in., tonnage 752. Laid down at Deptford Yard in April 1851. Launched in June 1852.

Designed by Surveyor's Department.

There were also built on the same lines, the "ALERT," at Pembroke in 1856, the "FALCON," at Pembroke in 1854, the "HARRIER," at Pembroke in 1854, &c.

The armament was as follows :

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
16 -	- 32	- 32	- 6 6
1 -	- 32 pivot	- 56	- 9 6
<hr/>			
17			

The complement of men was 160.

334. The "CURLEW," 9 guns, 60 horse-power, (on a $\frac{1}{4}$ in. scale), length 139 ft., breadth 27 ft. 11 in., depth 13 ft. 5 in., tonnage 486. Laid down at Deptford Yard in October 1852. Launched in May 1854.

Designed by Surveyor's Department.

There were also built on the same lines the "ARIEL," at Pembroke in 1854, the "SWALLOW," at Pembroke in 1854, and the "LYRA," at Deptford in 1857.

The armament was as follows:

No.	Prs.	Weight.	Length,
		cwt.	ft. in.
8	32	25	5 4
1	32 pivot	56	9 6
9			

The complement of men was 100.

335. The "PYLADES," 21 guns, 350 horse-power, (on a $\frac{1}{4}$ in. scale), length 192 ft. 9 in., breadth 38 ft. 5 in., depth 23 ft. 11 in., tonnage 1,278. Laid down at Sheerness Yard in May 1853. Launched in November 1854.

Designed by Surveyor's Department.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
20	8-in.	60	9 0
1	68-pr. pivot	95	10 0
21			

The complement of men was 240.

336. The "PEARL," 21 guns, 400 horse-power, (on a $\frac{1}{4}$ in. scale), length 200 ft., breadth 40 ft. $4\frac{1}{2}$ in., depth 13 ft. 8 in., tonnage 1,469. Laid down at Woolwich Yard in January 1854. Launched in September 1855.

Designed by Surveyor's Department.

There were also built on the same lines the "CADMUS," at Chatham in 1856, the "SATELLITE," at Devonport in 1855, &c.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
20	8-in.	60	9 0
1	68-pr. pivot	95	10 0
21			

The complement of men was 260.

337. The "RACCOON," 22 guns, 400 horse-power, (on a $\frac{1}{4}$ in. scale), length 200 ft. 1 in., breadth 40 ft. 4 in., depth 22 ft. 8 in., tonnage 1,467. Laid down at Chatham Yard in April 1856. Launched in April 1857.

Designed by Surveyor's Department.

There were also built on the same lines the "CHALLENGER," at Woolwich in 1858, and the "CLIO," at Sheerness in 1858.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
20	- 8-in.	60	8 10
2	- 68-pr. pivot	95	10 0
22			

The complement of men was 280.

338. The "RINALDO," 17 guns, 200 horse-power, (on a $\frac{1}{4}$ in. scale), length 185 ft. 1 in., breadth 33 ft. 2 in., depth 17 ft. 5 $\frac{1}{2}$ in., tonnage 951. Laid down at Portsmouth Yard in March 1858. Launched in March 1860.

Designed by Surveyor's Department.

There were also built on the same lines the "CHAMELEON," at Deptford in 1860, the "PELICAN," at Pembroke in 1860, the "ZEBRA," at Deptford in 1860, &c.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
16	- 32	32	6 6
1	- 32-pr. pivot	58	9 6
17			

The complement of men was 170.

YACHTS.

360. The "AMERICA," yacht. For description see Class I., Div. A., No. 140.

361-2. Two American clipper yachts which excited a great deal of attention some years ago, on account of the peculiarity of their form and of the superior sailing qualities which they possessed.

363. The "AEGIR," 80 horse-power and 255 tons, (on a $\frac{1}{4}$ in. scale). Built of iron by Messrs. Fairbairn and Co. in 1842 for His Majesty the King of Denmark.

364. The "PROBLEM" (on a 2 in. scale), an experimental yacht. Designed by Mr. Henry Dempster of the Honourable East India Company's Service about the year 1848.

The following account of this vessel is given in the "Newcastle Express." "The hull was triangular, the stern post " being made to rake at the same angle as the stem, so " that both met and terminated in a triangular point under " water. This yacht was rigged with three masts, iron " built, and ballasted with lead. Among other experiments " by the inventor was the following tested at Newcastle " by driving two stakes into the ground at low water " mark, to which a strong iron bar was lashed horizontally. " When the tide rose sufficiently high to show that there was " one foot and a half less than the 'PROBLEM' required to " sail clear of the obstruction, (and consequently that the " vessel could strike it with her angular keel) she was " sailed stem on at the bar, a stiff breeze blowing at the " time, when she went over it by rise and fall similar to a " horse jumping a gate."

She was lost at Shields in 1850.

SHOT-PROOF SHIPS.—DESIGNS PROPOSED, BUT NOT ADOPTED.

370. MODELS, three in number (*a*, *b*, and *c*), of a design for an iron-cased ship. Proposed by Messrs. R. Napier & Sons in 1859.

371. Design for a shot-proof ship. Proposed by Mr. J. Thomson in 1862.

372. Design for a shot-proof ship. Proposed by Mr. W. Marshallsay, Shipwright, Deptford Yard, in 1862.

373. Design for a shot-proof ship and ram. Proposed by Mr. R. W. Reeves in 1863.

374. Design for a shot-proof ship. Proposed by Messrs. H. Robinson & Son in 1863.

375. MODEL (on a $\frac{1}{4}$ inch scale), of a design for an iron-cased ship. Proposed by Messrs. Westwood, Baillie, & Co. in 1859.

MISCELLANEOUS.

386. Design for a steam vessel of 2,495 tons with two paddle boxes. Proposed in 1840 by Mr. W. Early, Shipbuilder, Worthington, America.

387. A Bermudian vessel. Recommended by Sir Charles Adams, about the year 1843.

388. MODEL of a screw steamer, showing improvements in construction. Suggested by Mr. E. A. Bourray of New York, in 1853.

389. The "ALFRED," an iron vessel of 70 horse-power, (on a $\frac{1}{4}$ in. scale), length 170 ft., breadth 27 ft. 6 in., depth 15 ft. 8 in., tonnage 617. Built at Sunderland in 1854. Purchased by the Commissariat Department from Mr. Brunton for a floating bakery for the Black Sea in January 1855. Sold in October 1856.

Her name was changed to "ABUNDANCE" in February 1855.

390. The "RESOLUTE" iron troop ship, 400 horse-power, (on a $\frac{1}{4}$ inch scale), length 282 ft. 10 $\frac{1}{2}$ in., breadth 36 ft. 4 $\frac{3}{4}$ in., depth 24 ft. 1 $\frac{1}{2}$ in., tonnage 1,793. Built by Mr. Laird at Birkenhead. Purchased and launched in 1855. Designed by Mr. Laird.

There was also built on the same lines the "ASSISTANCE" at Birkenhead, in 1855.

Her name was changed to "ADVENTURE" in February 1857.

391. Design for a screw steamer. Proposed by Mr. Alexander Denny, Iron Shipbuilder, Dumbarton, in 1856.

392. Design for a steam vessel to be propelled by two screws, one on each side of the vessel in midships. Proposed by Mr. E. S. Renwick, in 1862.

393. MODEL showing a vessel fitted with the "Navigable Depth Indicator," as proposed by Mr. W. Rogers, in 1862.

DIVISION C.—Models of Bows of Ships, arranged as in Division A.

LINE-OF-BATTLE SHIPS.

451. Bow of the "ROYAL GEORGE," 100 guns (on $\frac{1}{2}$ in. scale).
Designed by Mr. J. Pownoll.

Launched at Woolwich Yard in 1756.

452. Starboard side of the bow of a 74-gun ship (on $\frac{1}{4}$ in. scale), representing the form of bow of a 2-deck ship of the latter period of the 18th century. The exact ship or date is not known.

453. Bow of a 120-gun ship (on $\frac{1}{2}$ in. scale), showing on one side the old plan of fillings between the cheeks, and on the other the plan without fillings.

Proposed by Mr. R. Blake, and adopted in the "WAR-SPITE," 74 guns, which was launched at Chatham Yard in 1807, and afterwards cut down to a frigate: she is now used for the Marine Society School, and lies in Woolwich Reach.

454. Bow (round) for line-of-battle ships, (on $\frac{1}{2}$ in. scale).
Proposed by Mr. R. Blake, and adopted in the "VINDICTIVE," 74 guns, launched at Portsmouth Yard in 1813.

455. Larboard side of the bow of the "PRINCESS CHARLOTTE," 120 guns, (on $\frac{1}{2}$ in. scale), launched at Portsmouth Yard in 1825, showing cheeks and timbers without fillings.

Proposed by Mr. R. Blake for all line-of-battle ships, and adopted in this and other ships.

456. Bow of H.M.S. "THUNDERER," 84 guns, (on $\frac{3}{4}$ in. scale), launched at Woolwich Yard in 1831, showing the advantages of a round bow.

Proposed by Sir Robert Seppings, and adopted in this and other ships.

457. Bow of H.M.S. "VANGUARD," 80 guns, (on $\frac{1}{2}$ in. scale), launched at Pembroke Yard in 1835.

Designed by Sir Wm. Symonds.

458. Bow of H.M.S. "QUEEN," 116 guns, (on $\frac{1}{8}$ in. scale), launched at Portsmouth Yard in 1839.

Designed by Sir Wm. Symonds.

This is the MODEL which was made for the inspection of His Majesty King William IV.

459. MODEL (on $\frac{1}{2}$ in. scale) of the same as preceding.

460. Bow of H.M.S. "CUMBERLAND," 70 guns, (on $\frac{1}{2}$ in. scale), launched at Chatham Yard in 1842.

Designed by Sir Wm. Symonds.

461. Bow of H.M.S. "ALBION," 90 guns, (on $\frac{1}{2}$ in. scale), launched at Devonport Yard in 1842.

Designed by Sir Wm. Symonds.

462. Bow for a 3-decked ship of 120 guns (on $\frac{1}{2}$ in. scale), starboard side complete; larboard side showing the disposition of the timbers, also training of the guns.

Proposed by the Committee of Master Shipwrights in 1844, but not adopted.

463. Larboard side of the bow of H.M.S. "MARLBOROUGH," 131 guns, (on $\frac{1}{4}$ in. scale), launched at Portsmouth Yard in 1855.

Designed by Surveyor's Department.

FRIGATES.

470. Bow of H.M.S. "PIQUE," 40 guns, (on $\frac{1}{2}$ in. scale), launched at Devonport Yard in 1834.

Designed by Sir Wm. Symonds.

471. Bow of H.M.S. "ALARM," 26 guns, (on $\frac{1}{2}$ in. scale), launched at Sheerness Yard in 1845.

Designed by Sir Wm. Symonds.

472. Starboard side of the bow of H.M.S. "SHANNON," (on $\frac{1}{2}$ in. scale).

Designed by Surveyor's Department.

Launched at Portsmouth Yard in 1855, showing accommodation seats forward housed.

473. New form of bow.

Proposed for steam ships by Captain Newell in 1857.

SLOOPS, BRIGS, &c.

477. Bow of a paddle-wheel steamer of the "SAMSON" class, altered so as to show an arrangement to enable them to carry two guns instead of one.

Proposed by Sir Thomas Hastings, 1844.

DIVISION D.—Models of Midship Sections of Ships, arranged as in Division A.

LINE-OF-BATTLE SHIPS.

481. Midship section of H.M.S. "CALEDONIA," 120 guns, (on a $\frac{1}{2}$ in. scale). Designed by Sir Wm. Rule.
Launched at Plymouth in 1802.

482. Midship section of H.M.S. "ROCHFORD," 74 guns, (on $\frac{1}{2}$ in. scale). Designed by Mons. Barrallier.
Launched at Pembroke in 1814.

483. Midship section of H.M.S. "VANGUARD," 80 guns, (on $\frac{1}{2}$ in. scale). Designed by Sir Wm. Symonds.
Launched at Pembroke in 1835.

484. Midship section of H.M.S. "VANGUARD," 80 guns, (on $\frac{1}{2}$ in. scale). Designed by Sir Wm. Symonds.
Launched at Pembroke in 1835. This MODEL shows the internal fittings of the ship.

485. Midship section of H.M.S. "QUEEN," 116 guns, (on a $\frac{1}{2}$ in. scale). Designed by Sir Wm. Symonds.
Launched at Portsmouth Yard in 1839.

486. Midship section of H.M.S. "QUEEN," 116 guns, (on a $\frac{1}{2}$ in. scale). Designed by Sir Wm. Symonds.
Launched at Portsmouth Yard in 1839. This MODEL shows the internal fittings of the ship.

FRIGATES.

497. A set of MODELS (on a $\frac{1}{2}$ in. scale), four in number (a. b. c. d.), for ascertaining the inclination of the following ships:—

(a.) H.M.S. "PIQUE," 36 guns, (on $\frac{1}{2}$ in. scale).

Designed by Sir Wm. Symonds.

Launched at Devonport in 1834.

(b.) H.M.S. "THETIS," 36 guns, (on $\frac{1}{2}$ in. scale).

Designed by Messrs. Read, Chatfield, & Creuze.

Launched at Devonport in 1846.

(c.) H.M.S. "SPARTAN," 26 guns, (on a $\frac{1}{2}$ in. scale).

Designed by Sir Wm. Symonds.

Launched at Plymouth in 1841.

(d.) H.M.S. "EURYDICE," 26 guns, (on $\frac{1}{2}$ in. scale).

Designed by Admiral the Hon. George Elliot.

Launched at Portsmouth in 1843.

498. Midship section of H.M.S. "PIQUE," 36 guns, (on $\frac{1}{2}$ in. scale).

Designed by Sir Wm. Symonds.

Launched at Devonport in 1834. This MODEL shows the internal fittings of the ship.

SLOOPS, YACHTS, &c.

509. Midship section of a merchant ship.

Designed by Sir Robert Seppings about the year 1816.

DIVISION E.—Models of Sterns of Ships,
arranged as in Division A.

LINE-OF-BATTLE SHIPS OF THREE DECKS.

521. Stern (square) of the "TEMERAIRE," 98 guns, (on $\frac{1}{4}$ in. scale), launched at Chatham Yard in 1798. This MODEL represents the ship as she appeared in Portsmouth Harbour after the battle of Trafalgar in 1805.

522. Stern (square) of H.M.S. "HIBERNIA," 110 guns, (on $\frac{1}{4}$ inch scale), launched at Devonport Yard in 1804.

Designed by Sir John Henslow.

523. Half of the stern, starboard side (circular), of H.M.S. "HIBERNIA," 120 guns, (on $\frac{3}{4}$ in. scale), launched at Devonport Yard in 1804 with a square stern, which was afterwards altered to a circular one by Sir R. Seppings. This MODEL also shows the method of fitting the quarter gallery and rudder chock.

524. Stern (circular) of H.M.S. "CALEDONIA," 120 guns, (on $\frac{1}{4}$ in. scale). Designed by Sir Wm. Rule.

Launched at Devonport Yard in 1808 with a square stern, which was afterwards altered to a circular stern.

525. Stern (circular) for first-rates, (on $\frac{3}{4}$ in. scale), starboard side complete with the quarter galleries, larboard side showing the disposition of the timbers.

Proposed by Sir Robert Seppings, and adopted in the "QUEEN CHARLOTTE," 104 guns, launched at Deptford Yard in 1810.

526. Stern (square) of H.M.S. "BOYNE," 98 guns, (on $\frac{3}{4}$ in. scale), launched at Portsmouth Yard in 1810. Starboard side complete, larboard side showing the disposition of the timbers as adopted in that and other ships.

527. Stern (circular) of H.M.S. "PRINCE REGENT," 120 guns, (on $\frac{1}{2}$ in. scale), launched at Chatham Yard in 1823. Built as the "CALEDONIA"—see MODEL, No. 524.

528. Stern (elliptical) of H.M.S. "PRINCESS CHARLOTTE," 104 guns, (on $\frac{3}{4}$ in. scale), launched at Portsmouth Yard in 1825. Starboard side complete, larboard side showing the disposition of the timbers.

Proposed by Sir Robert Seppings, and adopted in that ship.

529. Stern (elliptical) for a 3-decked ship of 120 guns, (on $\frac{1}{2}$ in. scale).

Proposed by Sir Henry Blackwood in 1833, but not adopted.

530. Stern (elliptical) of H.M.S. "QUEEN," 116 guns, (on $\frac{1}{2}$ in. scale), launched at Portsmouth Yard in 1839.

Designed by Sir Wm. Symonds.

531. Stern (elliptical) of H.M.S. "ROYAL ALBERT," 121 guns, (on $\frac{1}{2}$ in. scale), launched at Woolwich Yard in 1854. Starboard side complete, larboard side showing the disposition of the timbers.

Proposed by the Committee of Master Shipwrights.

532. Stern (elliptical) of H.M.S. "HOWE," 121 guns, (on $\frac{1}{4}$ in. scale), launched at Pembroke Yard in 1860. Star-

board side complete, larboard side showing the disposition of the timbers adopted in that ship.

533. Stern, starboard side (elliptical) of a first-rate, (on $\frac{1}{4}$ in. scale).

Proposed by Mr. Oliver Lang in 1854 for the "ROYAL ALBERT," 121 guns, but not adopted.

LINE-OF-BATTLE SHIPS OF TWO DECKS.

543. Port side of an elliptical stern for a 74-gun ship, (on $\frac{1}{4}$ in. scale), representing the form of stern of a 2-deck ship of the latter period of the 18th century. The exact ship or date is not known.

544. Stern (circular) of H.M.S. "KENT," 74 guns, (on $\frac{1}{2}$ in. scale), built by contract in 1798 in the River Thames, by Mr. Perry, with a square stern.

545. Stern (square) of H.M.S. "CAMBRIDGE," 78 guns, (on $\frac{3}{4}$ in. scale), launched at Deptford Yard in 1815, after the Danish ship "CHRISTIAN THE VIIITH," captured at Copenhagen.

546. Stern (elliptical) for a 2-decked ship of 74 guns (on $\frac{1}{4}$ in. scale).

Proposed about the year 1828, by Mr. Gill, Foreman of Shipwrights, Deptford Yard, but not adopted.

547. Stern (circular) for a 2-decked ship of 74 guns, (on $\frac{1}{2}$ in. scale), starboard side complete, larboard side showing the disposition of the timbers.

Proposed by Commander Lewis about the year 1830, but not adopted.

548. Stern (circular) for a 92-gun ship (on $\frac{3}{4}$ in. scale).

Proposed by Sir Robert Seppings in 1832, and adopted in H.M.S. "NILE," "LONDON," and "RODNEY."

549. Stern of a ship similar to H.M.S. "CANOPUS," 84 guns, (on $\frac{3}{4}$ in. scale), showing the difference between the circular and square sterns, and the improvements proposed and adopted by Sir Robert Seppings in the sterns of the ships built on her lines between 1821 and 1832, viz., "ASIA," "BOMBAY," "CALCUTTA," "CLARENCE," "FORMIDABLE," "GANGES," "MONARCH," "POWERFUL," "THUNDERER," "VENGEANCE." The "CANOPUS" was built by

the French at Toulon in 1796, and captured from them in 1798.

550. Stern (circular) of ships of the "CANOPUS" class, 84 guns, (on $\frac{3}{4}$ in. scale), built by Sir Robert Seppings between 1821 and 1832, viz., "ASIA," "BOMBAY," "CALCUTTA," "CLARENCE," "FORMIDABLE," "GANGES," "MONARCH," "POWERFUL," "THUNDERER," and "VENGEANCE."

551. Stern (elliptical) of H.M.S. "VANGUARD," 80 guns, (on $\frac{1}{2}$ in. scale), launched at Pembroke Yard in 1835.

Designed by Sir William Symonds.

552. Half of the stern (circular) of H.M.S. "INDUS," 78 guns, (on $\frac{2}{3}$ in. scale), launched at Portsmouth Yard in 1839.

Proposed by Mr. J. Peake, Portsmouth Yard, and adopted in that ship.

553. Stern (elliptical) of H.M.S. "ALBION," 90 guns, (on $\frac{1}{2}$ in. scale), launched at Devonport Yard in 1842.

Designed by Sir William Symonds.

554. Stern (elliptical) of H.M.S. "CUMBERLAND," 70 guns, (on $\frac{1}{2}$ in. scale), launched at Chatham Yard in 1842.

Designed by Sir William Symonds.

555. Stern (elliptical) of H.M.S. "CUMBERLAND," 70 guns, (on $\frac{1}{2}$ in. scale).

Designed by Sir William Symonds, launched at Chatham Yard in 1842, showing an arrangement for guns to fire right aft.

556. Stern (elliptical) of H.M.S. "BOSCAWEN," 70 guns (on $\frac{1}{2}$ in. scale).

Designed by Sir William Symonds, launched at Woolwich Yard in 1844; showing arrangement for guns to fire right aft, proposed by the Committee of Master Shipwrights, and adopted in that and other ships.

557. Stern (circular) for a 2-decked ship of 90 guns (on $\frac{1}{4}$ in. scale).

Proposed by Mr. Fincham about the year 1844, but not adopted.

558. Stern (elliptical), (on $\frac{1}{2}$ in. scale).

Proposed by Sir William Symonds for H.M.S. "ORION," 80 guns, ordered to be built in 1848, and commenced at Chatham Yard in 1850, as a sailing ship. The "ORION" was, however, altered to a screw ship of 91 guns before launching.

559. Stern (elliptical) of H.M.S. "JAMES WATT," 91 guns, (on $\frac{1}{2}$ in. scale), launched at Pembroke Yard in 1853. Designed by Surveyor's Department.

560. Section of the "JAMES WATT," 91 guns, (on $\frac{1}{2}$ in. scale), referred to above, showing the position of the flap or shutter to the well for the screw.

FRIGATES.

571. Stern (circular) of a vessel similar to H.M.S. "SERINGAPATAM," 38 guns, (on $\frac{1}{2}$ in. scale), launched at Bombay in 1819, one side square as built, the other side circular, and without quarter gallery, showing an improvement proposed for frigates by Sir Robert Seppings.

572. Stern (circular) for frigates of 50 guns (on $\frac{1}{8}$ in. scale).

Proposed about the year 1820, by Mr. Roberts, Master Shipwright, Pembroke Yard, but not adopted.

573. Stern of a vessel similar to H.M.S. "HEBE," "CLYDE," &c., 46 guns, (on $\frac{1}{2}$ in. scale), built about the year 1826, one side showing the old stern (square), the other the improved circular stern with quarter gallery, as adopted for these ships by Sir Robert Seppings.

574. Stern of H.M.S. "EAGLE," 50 guns, (on $\frac{1}{4}$ in. scale), showing the square plan of construction, and the circular, proposed by Sir Robert Seppings.

She was originally built (in 1804) as a line-of-battle ship of 74 guns, but in 1831 was razed to a frigate of 50 guns, with a circular stern.

575. Half of the stern (circular) of H.M.S. "IMOGENE," 28 guns, (on $\frac{1}{2}$ in. scale), launched at Pembroke Yard in 1831.

Proposed by Mr. J. Peake, Master Shipwright, Pembroke Yard.

576. Stern (circular) of H.M.S. "CASTOR," 36 guns, (on $\frac{3}{4}$ in. scale), launched at Chatham Yard in 1832, showing the improvements (as compared with the square stern of the "PERLIN," 36 guns, (on $\frac{3}{4}$ in. scale), captured from the Danes in 1807,) proposed by Sir Robert Seppings, and adopted in the "CASTOR" and other ships.

577. Stern (circular) of H.M.S. "CASTOR," 36 guns, (on $\frac{3}{4}$ in. scale), launched at Chatham in 1832, starboard

side complete, port side showing the disposition of the timbers.

Proposed and adopted by Sir Robert Seppings for this ship and others of her class.

578. Stern (circular) of H.M.S. "CASTOR," 36 guns, (on $\frac{3}{4}$ in. scale), launched at Chatham Yard in 1832, showing the disposition of the timbers.

Proposed and adopted by Sir Robert Seppings, for this ship and others of her class.

579. Stern (circular) of H.M.S. "CASTOR," 36 guns, (on $\frac{3}{4}$ in. scale), launched at Chatham in 1832, showing the planking right aft.

Proposed by Sir Robert Seppings, and adopted in this ship and others of her class.

580. Stern (circular) of H.M.S. "CASTOR," 36 guns, (on $\frac{1}{2}$ in. scale), launched at Chatham in 1832, starboard side complete, port side showing the disposition of the timbers.

Adopted by Sir Robert Seppings in this ship and others of her class.

581. Stern (elliptical) of H.M.S. "VERNON," 50 guns, (on $\frac{1}{4}$ in. scale), launched at Woolwich Yard in 1832, starboard side complete, port side showing the disposition of the timbers.

Proposed and adopted by Sir Wm. Symonds in this ship.

582. Starboard side of the stern (elliptical) of H.M.S. "VESTAL," 26 guns, (on $\frac{1}{4}$ in. scale), launched at Sheerness Yard in 1833.

583. Stern (elliptical) of H.M.S. "PIQUE," 36 guns, (on $\frac{1}{2}$ in. scale), launched at Devonport Yard in 1834.

Designed by Sir Wm. Symonds.

584. Starboard side of the stern (elliptical) of H.M.S. "CLEOPATRA," 26 guns, (on $\frac{1}{4}$ in. scale), launched at Pembroke Yard in 1835.

Proposed by Mr. J. Edye, and adopted in this ship.

585. Stern (elliptical) of H.M.S. "INCONSTANT," 36 guns, (on $\frac{1}{2}$ in. scale), launched at Portsmouth Yard in 1836.

Designed by Admiral Hayes.

586. Port side of the stern (elliptical) of H.M.S. "WARSPITE," 50 guns, (on $\frac{1}{2}$ in. scale), launched at Chatham in 1807 as a third-rate of 74 guns, but in 1840 was razed to a frigate of 50 guns by Sir W. Symonds.

587. Stern (circular) of H.M.S. "WORCESTER," 50 guns, (on $\frac{1}{2}$ in. scale), launched at Deptford in 1843, starboard side complete, port side showing the disposition of the timbers.

Proposed by Sir Robert Seppings, and adopted in this ship and others.

588. Stern (elliptical) of H.M.S. "ALARM," 26 guns, (on $\frac{1}{2}$ in. scale), launched at Sheerness in 1845.

Designed by Sir Wm. Symonds.

589. Starboard side of the stern (elliptical) of H.M.S. "ACTIVE," 40 guns, (on $\frac{1}{4}$ in. scale), launched at Chatham Yard in 1845.

590. Stern (elliptical) for a frigate steamer, (on $\frac{1}{4}$ in. scale), showing the plates for working the pivot gun.

Proposed about the year 1845.

591. Stern (elliptical) of H.M.S. "DIAMOND," 28 guns, (on $\frac{1}{2}$ in. scale), launched at Sheerness Yard in 1848, showing the plates for working the pivot gun.

Proposed and adopted by Sir Wm. Symonds in this ship.

592. Stern (elliptical) of H.M.S. "NARCISSUS," 50 guns, (on a $\frac{1}{2}$ in. scale).

593. Stern (elliptical) of H.M.S. "EMERALD," 60 guns, (on a $\frac{1}{2}$ in. scale).

SLOOPs, YACHTS, &c.

604. Stern (square) of H.M.S. "EREBUS," launched at Pembroke in 1826, lost in the Arctic Regions about the year 1848.

605. Starboard side of the stern (elliptical) of H.M.S. "STAR," 8 guns, (on $\frac{1}{4}$ in. scale), launched at Woolwich Yard in 1835.

Proposed and adopted by Sir W. Symonds.

606. Starboard side of the stern (elliptical) of H.M.S. "PILOT," 16 guns, (on $\frac{1}{4}$ in. scale), launched at Devonport Yard in 1838, showing the shifting plank sheer to after port.

Proposed and adopted by Sir W. Symonds in that ship.

607. Stem of a paddle-wheel steamer of the "SAMSON" class, altered so as to show an arrangement to enable them to carry two guns instead of one.

Proposed by Sir Thomas Hastings, 1844.

608. Stern (circular) of H.M.S. "MUTINE," 17 guns (on $\frac{1}{4}$ in. scale), launched at Deptford Yard in 1859, star-board side showing the plan of fitting the quarters.

Proposed by Mr. Thornton, and adopted in H.M.S. "RANGER," port side showing the former plan of fitting the same.

609. Stern (circular), on $\frac{1}{4}$ in. scale.

Proposed by Mr. Thornton, Assistant Master Shipwright, for H.M.S. "CHAMELEON," launched at Deptford in 1860.

CLASS II.

Models of various Boats in use in Great Britain for Men-of-War, for saving Life, and other Purposes (also Life Rafts, Life Belts, Preservers, &c.)

Divisions.

- | | |
|--|---|
| A.—Man-of-war's boats. | E.—Plans for lowering boats, and stowing and securing them on board ship. |
| B.—Boats fitted for fighting guns, laying out anchors, &c. | F.—Miscellaneous boats and appliances. |
| C.—Boats and rafts for landing or embarking troops, &c. | |
| D.—Life boats, life rafts, buoys, preservers, &c. | |

DIVISION A.

MAN-OF-WAR'S BOATS.

1. Thirty-seven feet launch. A plan of Mr. Johns, foreman at Plymouth Yard. 1826.

2. Boat. By Captain Hayes, R.N. 1826.

3. Cutter. Proposed by Sir William Symonds.

4. Boats for a first-rate man-of-war, 9 in number (on $\frac{1}{2}$ in. scale). By Sir William Symonds. 1838.

5. Two midship sections of boats.

6. Section of a boat, showing an improvement in the gunwale for the rowlock, and rising timber for the thwart. Proposed by the Officers of Chatham Yard. 1849.

7. Boat, showing a plan by which the after-part may be drawn over the fore-part, and also a mode of slinging.

By Commander Boyd, R.N. 1855.

8. Stern of a boat, showing diagonal planking.

By Mr. Allan, Foreman Shipwright, Portsmouth Yard.

9. Model of a boat; extreme length, 43 ft. 10 in.

Proposed by Captain Maitland, R.N.

10. Barge, with sliding keel.

11. Upper part of longitudinal section of a boat in two parts, scarphed in midships.

DIVISION B.

BOATS FITTED FOR FIGHTING GUNS, LAYING OUT ANCHORS, &c.

20. Gun-boat and bridge.

Proposed by Mr. Oliver Sway, a Swede. 1808.

21. Section of a line-of-battle ship's launch, for mounting a carronade on a slide that traverses on its centre.

Proposed by Mr. Cow, Woolwich Yard. 1824.

22. Launch, fitted with trunks through the bottom for carrying out anchors and landing artillery.

By Mr. Cow, Woolwich Yard. 1824.

23. Boat, fitted for carrying out anchors.

Proposed by Lieutenant John Seccombe, R.N. 1850.

24. Flat-bottomed boat, fitted with a bed and mortar.

Proposed by Commander J. W. D. McDonald, R.N. 1856.

25. Launch, fitted with a gun (on $\frac{1}{2}$ in. scale).

26. Gun-boat.

27. Two boats for fitting carronade slides.

By Mr. John Merralls, Shipwright, Chatham Dockyard.

28. Launch, fitted with circle for carronade slide.

29. Flat-bottomed boat, to carry troops, fitted with carronade.

DIVISION C.

BOATS AND RAFTS FOR LANDING OR
EMBARKING TROOPS, &c.

- 40.** Boat for conveying horses.

Proposed by Mr. Cow, Cheapside.

- 41.** Flat-bottomed boat for transporting horses or cattle.

Proposed by Commander McDonald, R.N., Woolwich Dockyard. 1856.

- 42.** Sectional iron-boat for conveying troops over water.

By Mr. Macgregor Laird. 1856.

- 43.** Flat-bottomed cutter, supposed to be a troop-boat, with landing bridge.

- 44.** Flat-bottomed boat or raft fitted with a screw propeller and a plan for working it by manual labour, supposed to be intended for landing troops or horses.

DIVISION D.

LIFE BOATS, LIFE RAFTS, BUOYS, PRE-
SERVERS, &c.

- 50.** Shields life-boat, presented by his Grace the Duke of Northumberland, 1828.

Tried in 1790, and in use up to 1820.

This model represents the first life-boat used in England, invented by Henry Greathead, boat builder, of South Shields, in 1789, where it was built by subscription and launched in January 1790. Length, extreme, 30 feet; length of keel, 20 feet; breadth of beam, 10 feet 6 inches; depth of waist, 3 feet 3 inches; depth inside to the deck, 2 feet 4 inches; stem and stern alike, 5 feet 9 inches high; sheer of gunwale, 30 inches; pulls 10 oars, double banked, with thole pins and grummets, and steers with a sweep oar, very raking stem and stern post, broad keel, 12 inches wide, with great camber or curvature; a cork lining 16 inches thick for 10 feet on each side amidships from the deck to the thwart, and a cork fender outside, 16 inches deep, 4 inches thick, and 18 feet long, not

reaching to stem or stern within 6 feet. The boat would not free herself of water or self-right if upset.

51. Life-boat for packet steam vessels.

Proposed by Mr. John Edye in 1830.

This model represents the navy 24 feet cutter, with 8 feet beam, but made stem and stern alike, proposed to possess the advantage of extra buoyancy by an air-tight deck. Air chambers along the sides, 2 feet broad from deck to gunwale sloping inboard and 13 feet long, and air chambers 9 inches wide in the head and stern sheets. Proposed to pull 8 oars double banked, no provision is shown for the relief of water, or for self-righting if upset.

52. Three life-boats. 1830.

(a.) Represents a man-of-war's launch with a water-tight deck at 2 feet above the bottom of the boat, and water-tight compartments round the sides fore and aft, inside, 18 inches wide, from deck to thwarts, with seven tubes through the bottom for relief of water.

(b.) Represents a man-of-war's cutter with a water-tight deck and water-tight compartments round the boat inside, 15 inches wide from deck to thwarts, and six tubes through the bottom for relief of water.

(c.) Is of the form of a paddle-box boat with a water-tight deck and air chambers 2 feet 6 inches wide, on each side from the deck to the gunwale 13 feet long, and air chambers 12 inches wide round each bow 9 inches from the deck.

53. Life-boat with holes in the bottom and air-pipes under the flats.

Name of inventor not known. Received at the Admiralty October 1840. Supposed never to have been tried.

This boat is of the form generally given to a whale boat, both ends alike, with raking stem and stern post, moderate sheer of gunwale, and a leaden keel: extra buoyancy obtained by head and stern air chambers at the height of gunwale, and a water-tight deck fore and aft at the line of deepest immersion, leaving a space amidships one-sixth the length of the boat, covered with a grating, in which is fitted five copper tubes with screw valves; ample means is provided for the self-relief of water by thickly perforating the planks of the bottom in the vicinity of the well containing the copper tubes, but the boat would not self-right if upset.

54. Two MODELS from Mr. Payne.

Proposed by Mr. Payne (of the Colosseum), about 1842.

These models represent two submarine vessels, the upper extremities forward and aft representing the form of a pontoon, the lower parts that of a native canoe, with a very deep keel for stability; arrangements are made in the one for steering with a rudder at each end; they have each flush decks, but no provision appears to have been made for rendering assistance to a shipwrecked crew; in fact, the models do not possess any properties which would render them available as life-boats.

55. Twin life-boat and section.

Name of inventor not known. Received at the Admiralty 1843.

This model represents the two halves of a boat, with a space between equal to one-third of the greatest breadth, the horizontal sections being secured by athwartship ties; extra buoyancy is obtained by each section being divided and subdivided into air-tight compartments; an awning is provided to protect the men from being washed off, and provision is made to prevent the men falling through the open space. Proposed to pull eight oars, double banked, with pins and grummets.

56. Life-boat constructed of planks, hoops, &c.

Proposed by Sir John Collerton in 1843.

This model represents a pontoon, with the addition of a keel, and extremes resembling a native canoe; a wash board or bulwark is placed on each side, three-fifths of the whole length, leaving a space one-sixth the length, in which are placed the man-holes, three in number. The boat is proposed to be built with horizontal planking, secured with hoops placed at equal distances apart. No provision appears to have been made for rowers, and from the arrangement of the windlass and mast-holes it would indicate that this vessel was intended for sailing.

57. Life-raft.

1845.

This raft is formed by lashing the ends of two spars to two large casks, with gratings lashed across the spars for the protection of the crew and passengers.

58. Life-boat with flush deck.

Proposed by Mr. Darby in 1846.

The general form given to this model is that of a native canoe, with a moderate depth of waist, and very high extremes, but having the advantage of a much greater breadth

of beam, being in proportion to one-third the length. The boat is proposed to have a flush water-tight deck and water-tight hatches, to pull four oars, and steer with a sweep oar, the rowers to be protected by a leather pocket secured to the deck and strapped round the waist.

59. Life-boat "VICTORIA," with flush deck.

Proposed by Mr. Jones in 1847.

This model resembles the form of the ordinary whale boat, but without the sheer requisite in that class of boat; the boat is proposed to pull eight oars, single banked, with a flush deck, and the rowers to be secured to the deck; a cylinder is placed at each end for the purpose of passing the shipwrecked persons below. A leaden keel is shown which in some way would make up for the deficiency in breadth, it being only equal to one-sixth the length.

60. Life or safety boat.

Proposed by Mr. Richard Buxton in 1848. No trial was made.

This model represents in form a paddle-box boat, 13 feet long, 5 feet broad, and 2 feet deep, and is proposed to have two-thirds of the internal space of the boat made water-tight by enclosing a portion of the boat at either extremity, and also in the centre, the remaining spaces being considered by the inventor sufficient for the crew and shipwrecked passengers.

61. Twin life-boat with shifting bottom.

Name of inventor not known. Proposed in 1849.

This model represents the twin boat, the sides forming the two halves of a boat firmly secured or tied at each end, with that portion representing the bottom of a boat made shifting, so that in the event of a boat being capsized it would still possess the same advantages. Arrangements are also made forward and aft with sails or canvass attached to outriggers to prevent the sea breaking in upon the crew, made to act with the shifting bottom and offering protection in whatever position the boat may be placed; life lines are placed round the sides, but no provision is shown for the safety of the crew or passengers.

62. Life-boat.

By Mr. Fincham, late Master Shipwright, H.M. Dockyard, Portsmouth. 1851.

This model is a fac-simile of the Shields life-boat, invented by Greathead in 1790. Length, 26 feet; breadth, 10 feet; both ends alike, very raking stem and stern, great

curvature of keel and great sheer of gunwale. Proposed to pull eight oars double banked. A cork lining 16 inches thick is placed inside the boat for 12 feet on each side amidships from the deck to the thwarts, and a cork fender or belt outside, on each side 15 feet long and 18 inches deep; as in the Shields boat, no provision is made for self-relief of water, and the boat would not self-right if upset.

63. Section of the stern of a boat, showing a proposed plan for converting it into a life-boat.

Proposed by Lieut. James Seccombe, R.N., in 1851.

The life-boat in this case is proposed to be formed by placing an air-tight bag or covering over the ordinary boat as shown by the section, which when required for any particular service is to be inflated by the brass air pump, thus forming a double boat; this plan might be of service providing the outside inflated covering did not get punctured or injured going alongside of a vessel, for if such an accident did occur the consequences might be serious.

64. Life-boat, by Mr. G. Turner, Assistant Master Shipwright, Devonport Dockyard, 1851, now Master Shipwright H.M. Dockyard, Woolwich.

Proposed by Mr. George Turner in 1851.

This model represents a coastguard safety galley of the form usually given to a whale boat, having a long flat floor amidships, sides straight in a fore and aft direction, and raking stem and stern post. Length, extreme, 36 feet, breadth, extreme, 6 feet 3 inches; depth from gunwale to deck, 1 foot 3 inches, sheer of gunwale, 2 feet 3 inches; and to pull 7 oars single banked. Extra buoyancy obtained by a water-tight deck, 1 foot 3 inches below the gunwale, and raised air chambers, 7 feet long, in the extremes. The means of freeing the boat of water are by four scuppers on each side, on a level with the deck, 4 inches by 4 inches each, the water being led to the scuppers by a shoot or water-course under each thwart raised 3 inches above the deck and having its entrance amidship. This boat would self-right, if upset in a sea-way.

65. Life-boat.

By Commodore Lord John Hay, C.B., Superintendent of H.M. Dockyard, Devonport. 1851.

The general form of this boat is that of a whale boat, a long flat floor amidships, straight sides in a fore and aft direction, moderate rake of stem and stern post, peculiar build of narrow planks pinned together through the edges

and without timbers, said to be both durable and economical. Length, 32 feet; breadth, 7 feet 6 inches; depth, 3 feet 7 inches; sheer of gunwale, 25 inches; 7 thwarts, 9 inches below the gunwale and 11 inches above the flooring, proposed to pull 14 oars double banked. Extra buoyancy obtained by an air case under the flat or deck, 20 inches deep, and air cases in head and stern sheets for a length of 6 feet 6 inches up to gunwale height. The means of freeing the boat of water are five scuppers on each side, on a level with the flooring, 5 inches by 4 inches each, the water is led to the scuppers by a shoot or water-course under each thwart raised 4 inches above the deck and having its entrance amidships, so that when the boat rolls it is thought the water could not come into the boat through the scuppers. This boat would self-right if upset.

66. Life-boat.

Proposed by Mr. Harvey, late Modeller at the Admiralty, Somerset House, in 1851.

The general form of this boat is that given to a whale boat; a slightly rising floor amidships, sides straight in a fore and aft direction, and moderate rake of stem and stern post. Length extreme, 32 feet; breadth, 8 feet; and depth, 2 feet 9 inches, has six thwarts, and proposed to pull 12 oars double banked. Extra buoyancy is obtained by air cases round the sides sloping off to the gunwale and to the floor, and head and stern sheets for a length of 6 feet up to gunwale height, the whole divided into compartments and built into the boat. On the outside is placed a large cork fender extending fore and aft, and also life lines. The internal capacity for holding water is not large, but no provision is made for self-righting if upset.

67. Life-raft and small collapsing boat. 1852.

The life-raft is proposed to form the ordinary bridge used in steam vessels, at the same time possessing the properties of a life-raft by the introduction of a layer of cork lashed to the under side of each fore and aft beam, and gutta-percha tubing lashed round the inner sides of the beams forming the bridge; the life-boat proposed to be kept on the bridge, is by an ingenious construction made to expand or collapse by an iron rod which works into a ratchet plate secured to the boards which form the bottom of the boat.

68. Life-raft.

Proposed by Commander Boyd, R.N., in 1854.

69. Metallic life-car.

Proposed by M. Violette, Havre. 1855.

The model represents a shallow flat-floored boat, with a high cone-shaped cover rising from each side above the gunwale made water-tight, the object being when communication is once established with a stranded vessel by a line or hawser, to put the passengers into this covered car and drag them ashore through the surf unharmed.

70. Collapsing life-boat.

Proposed by Captain Halsted, R.N., in 1856.

This boat represents a life-raft, breadth equal to one-half the length. It is constructed of india-rubber secured to horizontal ribbands of wood at equal distances from the keel running fore and aft. The boat is made to collapse or expand at pleasure by the connexion of the material with the deck and central beam which is secured to the stems and keel, and kept in position by the athwartship beams secured by screws to the iron straps on the deck.

71. Collapsing life-boat.

(Supposed) to be by Captain Halsted, R.N. 1857.

This boat represents a life-raft, the breadth being equal to half the length. The boat is constructed of india-rubber secured to the keel and stems, and the horizontal ribbands at the height of the deck, and the parts forming the gunwale; the form is given to the boat or raft by an arrangement of planking or planks which form a deck, and to which seats are attached for the crew and passengers.

72. Life-raft constructed from spare spars and casks.**73. Life-raft.**

By Mr. T. Fonteneau, 1862.

Life-raft composed of spare spars lashed on either side of a tier of empty casks, the sides of the raft consisting of empty powder casks secured by planks and the studding sail booms, &c. The inventor has shown great ingenuity in this model; for the real use of a raft is that at the last extremity, and when all boats are stove or lost, it can be formed out of the spars, casks, and empty powder cases on board the stranded vessel, and thus afford the crew a means of escape by driving ashore before the wind and sea, and every sailor should make himself familiar with the plan for readily forming such a raft in time of need, but such rafts cannot be made applicable to the purposes of a life-boat when required to pull off a lee shore in a gale of wind.

74. Life-boat.

Proposed by Mr. James Morrison, an old pensioner, in 1863.

The general form of this boat is that of a whale boat, very raking stem and post, but with very moderate sheer. Extra buoyancy is obtained by a water-tight deck running fore and aft, raised cases at each end up to gunwale, height, $\frac{1}{6}$ the length of the boat, and a cylinder outside $\frac{1}{3}$ the depth of the boat at 6 inches below the gunwale not reaching the stem or post within 6 feet; means are provided for the relief of water by 6 tubes through the bottom; the boat is proposed to pull 16 oars double banked, to work in swivel crutches to admit of the oar laying fore and aft when going alongside a ship.

75. Screw life-boat.

Proposed by Mr. James Mackay, in 1863.

This boat has great rake of stem, deep keel and very rising floor. Extra buoyancy proposed to be obtained by $\frac{1}{4}$ the length from the fore part being made water-tight, and the form given to the sides, which are to be protected by rollers placed at equal distances round the sides; an ingenious attempt is made to show how the boat is to be propelled by a fan or screw by manual labour. This is one of the most favourite notions of inventors, and of even some scientific persons, that a life-boat could be propelled more rapidly by revolving paddles or screws, worked by winches within the boat, than by oars, but no proof has yet been adduced that sufficient power or speed can be obtained by such means.

76. Twenty-eight feet navy cutter life-boat.

Designed by the Controller of the Navy's Department. 1864.

This model represents an improved service cutter combining the essentials of a life-boat, viz., extra buoyancy, self-discharge of water, self-righting power, good stowage room for a shipwrecked crew, and great stability.

The diagonal mode employed in building this boat gives great strength, being composed of two thicknesses of $\frac{1}{4}$ -inch Honduras mahogany, with a layer of painted calico between, 20 of the planks of each skin are of one length worked from gunwale to gunwale. Length extreme, 28 feet; breadth, 7 feet 6 inches; depth inside, 3 feet 3 inches, height of deck above skin, 1 foot $1\frac{1}{2}$ inches; of thwart above deck, 1 foot $2\frac{1}{2}$ inches, and of gunwale above thwart, 10 inches; number of oars to pull double banked 10;

number of thwarts 5, and distance between the thwarts, 2 feet 5 inches. The chief peculiarity of the boat, which distinguishes it from the ordinary service cutter, is its being made unsubmergible by attaching to it a water-tight deck a little above the load water line, detached air cases round the sides under the thwarts, and the shifting cases in the extremes, the latter giving the righting power assisted by the iron keel. At the trial, which took place in H.M. Dockyard Deptford on the 7th September 1864, the boat on being hoisted up under a crane righted herself immediately, and freed herself of all water by the six 6-inch self-acting valves in 25 seconds; 40 men were seated comfortably round the sides and with 34 men, or 19 men in addition to the crew and gear, the boat would relieve herself of any sea that might break into her,

77. Twenty-seven feet navy whale life-boat.

Designed by the Controller of the Navy's Department. 1864.

This boat possesses all the qualities of a ship of war's whale boat. Length extreme, 27 feet; breadth, 5 feet 6 inches; depth inside, 2 feet 3 inches, is diagonally built of two thicknesses of $\frac{1}{4}$ -inch mahogany, with a layer of painted calico between; the advantages consisting of the extra buoyancy obtained by the detached air-tight cases placed on the floor, in the head and stern sheets, under the thwarts at the sides, central cases amidships and athwartships under the thwarts to prevent any rush of water fore and aft, and the raised air cases in the extremes, thereby rendering her capable of rising under the weight of water that may break into the boat, and thus enable the four 6-inch self-acting valves to act and to free the boat to the level of the load water line; thus with the arrangement of the shifting raised air cases in the extremes and the increased sheer given to the gunwales the boat would self-right if upset in a seaway, relieve herself of all water to the level outside, and be rendered impossible of foundering if met by a succession of seas breaking into her.

78. MODEL of the life-boat on transporting carriage adopted by the Royal National Life-boat Institution, 14, John Street, Adelphi.

Designed for the Institution by Mr. Joseph Prowse in 1861.

The form of this boat is that usually given to a whale boat with a long flat floor amidships, sides straight, raking stem and stern post, diagonally built of two thicknesses of

mahogany and copper fastened. Length, extreme, 33 feet ; breadth of beam, 8 feet, and depth inside, 3 feet 4 inches. The boat has five thwarts 2 feet 8 inches apart, and pulls 10 oars double banked in crutches formed on the thole pin. Extra buoyancy is obtained by the compartments under the deck being filled with water-tight cases packed with cork, detached air cases under the head and stern sheets, and along the sides under the thwarts, and the end air cases in the extremes. It is not probable that this boat could be readily upset, but should such an accident occur provision is made by the sheer of gunwale, raised air cases in the extremes, weight of cork in the bottom, and the iron keel to cause her to right herself. The area of the delivering valves will enable the boat to readily free herself of all water above the deck in 20 seconds, with 47 persons on board.

This life-boat possesses in the highest degree all the qualities which it is desirable that a life-boat should possess, viz., great lateral stability, speed against a heavy sea, facility for launching and taking the shore, immediate self-discharge of any water breaking into it. The advantage of self-righting if upset, strength, and stowage room for a number of passengers.

The carriage consists of a fore and main body. The latter is formed of a keelway, and of side or bilgeways attached to the keelway, and resting on the main axle, the boat's weight being entirely on the rollers of the keelway. Its leading characteristic is that, on the withdrawal of a forelock pin, the fore and main bodies can be detached from each other. The advantages of this arrangement are, that whilst the weight of the boat, when she is launched from the rear end, forms an inclined plane by elevating the keelway, to replace her on the carriage she can be hauled bow foremost up the fore end or longer incline. The bilgeways are needed at the rear end, that the boat may be launched in an upright position with her crew on board, but they are not required at the fore end of the carriage. The boat is hauled off the carriage and launched into the sea by ropes rove through sheeves at the rear end of the carriage, each having one end hooked to a self-detaching hook at the boat's stern, and the other manned by a few persons on the shore, who thus haul the boat and her crew off the carriage and launch them afloat at once, with their oars in their hands ; by these means headway may be obtained before the breakers have time to beat the boat broadside on to the beach.

79. Specimen of wood ("Palode Balsa") used in the sailing rafts on the north coast of Peru, and proposed as suitable for lining the insides of boats on account of its great buoyancy. Proposed by Major-General Wavell. 1860.

80. Life-buoy.

By Mr. Henry Spencer, Second Gunner, H.M.S. "EXCELLENT." 1834.

81. Life-buoy, with air buoys, supported by framework. 1845.

82. Life-buoy.

By Lieutenant Watson, R.N., Weston-super-Mare. 1850.

83. Ring-shaped life-buoy, to be made either of reeds or copper (on a $2\frac{1}{6}$ in. scale).

By Mr. N. B. Dennys, Clerk, R.N., H.M.S. "BRITANNIA," 1860.

84. Life-buoy.

By Mr. E. B. Corse. 1862.

85. Life-buoy, with alarum inside.

86. Patent nautilus life preserver, with skeleton frame
By Mr. John Harman 1847

87. Life preserver.

88. Floating beacon.

By Mr. G. Cowell. 1863

89. Floating buoy, with beacon.

90. Plan of a brass scupper valve, proposed to be fitted to life-boats. 1863.

DIVISION E.

PLANS FOR LOWERING BOATS, AND STOWING AND SECURING THEM ON BOARD SHIP.

100. Paddle-box boat, showing the method of securing the boat to the paddle-box.

Proposed by Mr. James Edwards, Inspector of Shipwrights, Pembroke Yard, 1841.

101. Plan for raising and lowering paddle-box boats.

Proposed by Captain Smith, R.N.

102. Plan for raising or lowering paddle-box boats.
Proposed by Mr. W. Cudlip, Leading Man of Shipwrights.

- 103.** Plan for lowering paddle-box boats.
Proposed by Mr. Wratten. 1848.
- 104.** Three boom-boats, as arranged on the waist of H.M.S. "THETIS."
By Commander Boyd, R.N. 1852.
- 105.** Plan for lowering life boats.
Proposed by Lieutenant H. W. Hire. 1853.
- 106.** Paddle-box boat, and plan for raising and lowering the same. 1853.
- 107.** Paddle-box boat.
Proposed by Mr. Benjamin Bennett, Carpenter, H.M.S. "PYRAMUS." 1854.
- 108.** Section of a ship with boats secured to the side, showing a plan for raising and lowering the same.
Proposed by Mr. W. Ladd. 1863.
- 109.** Two paddle-box boats, as fitted to the "RETRIBUTION."
Proposed by Sir William Symonds.
- 110.** Hook and tackle for lowering boats.
- 111.** Plan for stowing booms and boat on a flush-decked vessel.
By Captain W. Fanshawe Martin, R.N.
- 112.** Plan for lowering boats. By Mr. R. Webb.
- 113.** Patterns of Shores's patent self-relieving hook for stern and quarter boats. 1832.
- 114.** Two wood models of slip hooks for letting go boats with iron lever. 1853.
- 115.** Mitcheson's patent iron slip-hook. 1854.
- 116.** Model of slip hook for lowering boats.
By Mr. James L. Smith. 1861.
- 117.** Full pattern of Kynaston's patent slip hook for boats with tackle. 1862.
- 118.** Wood pattern slip hook for letting go boats.
- 119.** Full metal pattern slip hook for letting go boats.

DIVISION F.

MISCELLANEOUS BOATS AND APPLIANCES.

- 130.** Barge, or shallop, built for William III. 1691.
- 131.** Mud punt.
Proposed by Mr. Perry, Plymouth Yard. 1830.

- 132.** Plan for building boats.
Proposed by Mr. Johns, Plymouth Yard. 1831.
- 133.** After-part of a boat, showing the plan of fitting the thwarts.
Proposed by Mr. John Merralls, Shipwright, Chatham Yard. 1832.
- 134.** Schooner (on a $\frac{1}{4}$ in. scale).
By Lieutenant Wilson, R.N.
- 135.** Admiralty barge.
By Sir William Symonds. 1838.
- 136.** Mud punt, to carry from 50 to 60 tons.
Proposed at Portsmouth Yard. 1838.
- 137.** Two sections of boats, with diagonal bottom.
- 138.** Section showing the plan of a lever and tumbler for slipping boats' gripes.
Proposed by Captain R. Moorman, R.N. 1862.
- 139.** Launch fitted with a crank and propeller, to be worked by manual labour.
Proposed by Messrs. McEwen. 1863.
- 140.** Diagonal boat.
By Mr. William Resterick, Plymouth Yard.
- 141.** Boat, carvel built. By Captain Beck, R.N.
- 142.** Two boats, constructed to be carried on the backs of camels.
By Sir William Symonds.
- 143.** Boat with lug sail, named the "FOLLY."
- 144.** Boat, made to separate transversely in midships.
- 145.** Curragh or light row boat, portable by one man, now used for fishing in the Atlantic, on the iron-bound coast of the West and North of Ireland.
- 146.** Two models, showing the method of fitting keels of clench-work boats.
- 147.** Boat in three sections, available for the transport of coals, guns, or troops.
Proposed by Mr. J. Edye for the use of the "PENELOPE" on the coast of Africa. 1844.
- 148.** Whale boat.
- 149.** Screw, box, and lever, for screwing the boat to the under carriage. 1847.
- 150.** Slide valve for ships' boats, to supersede the plug then in use.
By Lieutenant Charles Parker, R.N., Newark. 1851.

151. Boat's stern and rudder, showing plan for unshipping.
By Mr. David Harvey.

152. Two half models (*a* and *b*) of American whale boats.
Received from Mr. Barclay, H.M. Consul at New York.
1852.

153. Patent metallic boat.

Proposed by Mr. Francis, of New York, America, in
1851.

It was tried and is reported to have stood well. This boat is of the form of a ship's boat or barge, 28 feet long, 6 feet 6 inches beam, and 3 feet deep, proposed to pull 12 oars double banked. The boat is of galvanized iron, corrugated, made by machinery, which, it is stated, at the same time gives the requisite form and the corrugation; and it is the novel application of the principle of corrugation to boat building which is claimed as the peculiar merit of this boat.

154. Pattern gutta-percha valve, for the inside of boats.
1859.

155. Patent boat plug. By Mr. W. Lord. 1861.

156. Boat's davits.

CLASS III.

Models of Boats and Vessels used for fighting
and other Purposes at various Periods in
Foreign Countries.

1, 2. Chinese war boats.

3. Small Chinese boat.

4-9. Chinese boats.

10. Chinese flower boat, used for excursions of pleasure
at Canton.

11. Chinese trading boat.

12. Chinese boat.

13. Chinese mandarin boat.

14, 15. Two Chinese junks.

16. Chinese duck boat.

17. Chinese raft, supposed to be used for transporting timber.

18. Burmese war boat, from Rangoon. Presented to Sir Robert Seppings by his son, resident in India.

The Burmese war boats are all on the same plan, 120 feet in length, from 6 to 7 feet in breadth, and from 3 to 4 feet in depth.

19. North American canoe.

20. Flying prow of the Ladrone Islands.

21. Indian "TONAY" or canoe, used by the natives of Colombo, Ceylon.

22. Canoe, made from the bark of a birch tree, by "SHANAWADITHIT," an Indian woman, the last of the Boeothic, or red tribe of Newfoundland, and presented by her to Captain Jones, H.M.S. "ORESTES."

23. Maltese fighting galley.

24. Madras surf boat.

25-35. Market boats (eleven in number), of Point de Galle, Ceylon.

36. American sailing boat, as proposed by Captain Marryat.

37. Santander launch, (on a $\frac{5}{8}$ in. scale).

By Lord John Hay, R.N.

38. Santander fishing boat, (on a $\frac{3}{4}$ in. scale).

By Lord John Hay.

39. Ferrol fishing boat, (on a $\frac{1}{2}$ in. scale).

By Lord John Hay.

40. Castropol fishing boat, (on a $\frac{1}{2}$ in. scale).

By Lord John Hay.

41. Danish gun boat.

42. Danish war boat, with a prow head and pink stern.

43. Brazilian frigate, "CONSTITUTION."

44. Section of a Spanish barge.

45. Portuguese buoy.

CLASS IV.

Models showing Details of the Mode of Construction adopted or proposed for particular Parts of Ships, and the principal Changes which have at various Periods been made therein.

Divisions.

WOODEN SHIPS.

- A.—Keels, including blocks and wedges.
- B.—Floor timbers.
- C.—Futtocks and frames of ships.
- D.—Bow (framing).
- E.—Stern (framing, &c.)
- F.—Wales.
- G.—Beams.
- H.—Knees, shelf-piece, water-ways, &c., and mode of connecting beams to the ship's side.
- I.—Models of more general principles in the construction of wooden ships which cannot be classed under the above heads, such as diagonal riders, &c.

IRON SHIPS.

- K.—Keels.
- L.—Bow, stern, and midship framing.
- M.—Skin plating and riveting.
- N.—Beams, and mode of connecting the same to the ship's side.
- O.—Models of more general principles in the construction of iron ships which cannot be classed under the above heads, such as keelsons, longitudinal stringers, water-tight bulkheads, &c.

P.—Plans for fastening armour plates, including bolts, &c. for that purpose, also models showing the arrangement of armour plates.

Q.—Plans for rendering ships shot-proof. (See also Class I. Div. A.)

WOODEN SHIPS.

DIVISION A.

KEELS, INCLUDING BLOCKS AND WEDGES, &c.

1. Plan of wedges and angle blocks, as arranged under the keel.

Proposed by Mr. Read, adopted about 1800, and still in use.

2. Plan of blocks and wedges under keel.

Proposed in 1830, but not adopted.

3. Plan of blocks and iron wedges, the angular blocks lined with iron.

Proposed by Sir Robert Seppings, but not adopted.

4. Two sets of MODELS (A. and B.), being a plan of blocks, with wedges made to an angle of 20° , intended to show that with such inclination the wedges would spontaneously free themselves.

Proposed, but not adopted.

5. MODEL showing a plan proposed in 1846, by Captain Sir S. Brown, for fitting a keel so that it may be turned flat against the bottom, and so reduce the draught of water when required.

6. Plan for combining the after piece of the keel with the stern post, to facilitate a ship getting off after grounding, without extreme injury, and to assist the conversion of the foremost post, inasmuch as the length of the post will be shortened by the depth of the upper keel and chock.

Proposed in 1855 by Mr. Fincham, Assistant Master Shipwright, Chatham Yard, for the "RENOWN," and adopted in that ship.

7. MODELS of three battering rams for driving wedges and blocks under keels.

Proposed by Sir Robert Seppings, but adopted in a modified form.

8. Piece of keel and false keel in common use.

DIVISION B.

FLOOR TIMBERS.

21. Part of frame, consisting of a cross chock floor and two first futtocks, for a 46-gun frigate, put together after the fashion in the year 1806, and in use until 1814.

22. MODEL showing the plan of making floors out of straight timber.

Proposed by Mr. Blake, and adopted in Woolwich Dockyard, 1806.

23. A bent floor with a saw kerf in the middle of the siding of the same.

Proposed and adopted by Mr. Hookey, Assistant Master Shipwright, Woolwich Yard, about the year 1808.

24. MODEL showing the plan of making floors (with a view thereby to improve on Mr. Blake's floors).

Proposed by Mr. Boddy, Assistant Master Shipwright, Woolwich Yard, in 1812.

25. Part of frame, consisting of a cross piece, two half floors and two first futtocks.

Proposed by Sir Robert Seppings, and adopted in 1813.

26. MODEL showing a plan for making floors out of straight timber. Proposed about 1814, but not in use.

27. MODEL showing an arrangement of the floor, cross chock, and part of frame in use prior to 1813.

28. MODEL showing the keel, floor timbers, keelson, &c., as proposed and adopted by Sir Robert Seppings.

29. MODEL of part of frame, showing a plan of coaking the timbers sideways.

Proposed in 1820, but not adopted.

30. Two MODELS showing the arrangement of the floor timbers and filling frame. (A.) common shift of frame to heads; (B.) filling frame and floor, with long and short heads; (C.) short first futtocks, and floor to the sirmark head.

Proposed in 1832 by Mr. J. Edye, and in use at the present time.

31. Two MODELS of floor timbers, secured by iron plates. Proposed by Mr. G. Atkins, Chief Draughtsman, Portsmouth Yard, 1840, but not adopted.

32. A plan for fitting thick garboard strakes.

Proposed by Mr. Hookey, Devonport Yard, 1843.

DIVISION C.

FUTTOCKS AND FRAMES OF SHIPS.

41. Two MODELS showing how futtocks may be made by scarphing when they cannot be obtained in one piece.

42. MODEL of the old plan of framing men-of-war, with angular chocks at the heads and heels of the timbers, as in use prior to the year 1814.

43. MODEL of two midship frames, the first (A.) having the timbers united by chocks, according to the plan in use

prior to 1814; the other (B.) having square heads and heels, according to the plan now in use.

44. Represents a frame made with three instead of two timbers.

Proposed and partially adopted by Sir Robert Seppings about 1820, but not now in use.

45. Represents part of a frame showing the method of filling the opening between the timbers, fillings driven from the inside and outside of the openings, the middle filled up with cement.

Proposed and adopted by Sir Robert Seppings, but not now in use.

46. MODEL showing a mode of forming a ship's frame by a combination of wood and iron.

Proposed by Mr. Husband in 1852, but not adopted.

47. Represents the longitudinal sections of a 74-gun ship's frame. The starboard side made out of small or frigate timber in short lengths, and square heads and heels, on a plan introduced and adopted by Sir Robert Seppings in the year 1814; the larboard side framed on the common principle, with angular chocks on the heads and heels.

DIVISION D.

BOW (FRAMING.)

61. MODEL made by Sir Robert Seppings in the third year of his apprenticeship, showing the method of framing the bow on the old plan of the beak head.

This plan was in use up to about the year 1813.

62. MODEL by Sir Robert Seppings, showing the mode of framing the bow without a beak head.

This plan superseded that of the beak head, and was introduced about the year 1813.

63. MODEL showing the mode of forming and connecting the keel, stem, apron, deadwood, stemson, and keelson.

This model was made by Mr. G. Atkins, Chief Draughtsman, Portsmouth Yard, about the year 1840.

64. MODEL showing the stem, stem-pieces, and knight-heads for a 74-gun ship (on a $\frac{3}{4}$ in. scale).

65. MODEL showing the mode of framing the lower part of the bow, as at present in use.

DIVISION E.

STERN (FRAMING, &c.)

81. MODEL showing the mode of forming a stern post for a ship with a square stern and transoms, as in use prior to 1810.

82. MODEL showing the usual mode of arranging and connecting the keel, stern post, deadwood, keelson, sternson, &c. in a sailing ship.

83. MODEL of one side of the frame of a square stern of a 74-gun ship (made by Sir Robert Seppings in the third year of his apprenticeship), showing the mode of framing the stern with transoms, side counter timber, &c., according to the method in use prior to the improvements introduced by Sir Robert Seppings about the year 1810.

84. MODEL showing the frame of a square stern, port side showing the mode of framing the stern with transoms, side counter timbers, &c., in use prior to 1810; the starboard side according to the plan introduced by Sir Robert Seppings about the year 1810, with only wing and deck transoms, and to which the frame timbers are brought up and connected.

85. MODEL of the framing of a square stern, showing how it may be constructed without any transoms, the stern timbers running down to the after cant timber.

86. MODEL of the frame of the upper part of a stern, the port side showing the disposition of the timbers for a square, the starboard for a round stern as introduced about the year 1815.

87. MODEL of the frame of the upper part of a circular stern, showing the general disposition of the timbers as arranged by Mr. Oliver Lang, Assistant Surveyor of the Navy, in 1817.

88. MODEL of the frame of the starboard side of the stern of a 2-decked ship, showing how the quarter gallery might be formed by the frame timbers.

89. MODEL of the starboard side of the stern of the "MONARCH," 84 guns, launched at Chatham Yard in 1832, showing the disposition of the timbers.

Proposed by Sir Wm. Symonds, and adopted in that ship.

90. MODEL of the starboard side of the stern of the "RODNEY," 92 guns, launched at Pembroke in 1833, showing the disposition of the timbers adopted in that ship.

91. MODEL of the frame of the upper part of the starboard side of the stern of H.M.S. "DIDO," 18 guns, launched at Pembroke Yard in 1836.

92. MODEL of the port side of the stern of the "QUEEN," 116 guns, launched at Portsmouth Yard in 1839, showing the disposition of the timbers.

Proposed by Sir Wm. Symonds, and adopted in that ship.

93. MODEL of the port side of the stern of the "ALBION," 90 guns, launched at Devonport Yard in 1842, showing the disposition of the timbers.

Proposed by Sir Wm. Symonds, and adopted in that ship.

94. MODEL of the port side of the stern of the "SUPERB," 80 guns, launched at Pembroke Yard in 1842, showing the disposition of the timbers.

Proposed by Sir Wm. Symonds, and adopted in that ship.

95. MODEL of the starboard side of the stern of the "CUMBERLAND," 70 guns, launched at Chatham Yard in 1842, showing the disposition of the timbers.

Proposed by Sir Wm. Symonds, and adopted in that ship.

96. MODEL of the frame of the stern of the "AGAMEMNON," 91 guns, launched at Woolwich Yard in 1852, showing the method of framing the stern of a screw ship, the port side as proposed by Mr. Oliver Lang, Master Shipwright, Woolwich Yard; the starboard side as built.

97. MODEL of the starboard side of the stern of H.M.S. "TRIBUNE," 31 guns, launched at Sheerness Yard in 1853, showing the plan of fitting the frame timbers, and well for raising the propeller.

98. MODEL of the starboard side of the stern of the "GALATEA," 26 guns, launched at Woolwich Yard in 1859, showing the disposition of the timbers.

Proposed by Surveyor's Department, and adopted in that ship.

99. Stern post and inner post prepared to take transoms. 1842.

DIVISION F.

WALES.

111. Represents the frame of a 74-gun ship, with wales worked and beams across.

DIVISION G.

BEAMS.

121. MODEL of a beam, showing an old plan of making a three-piece beam put together with nuts and screws.

122. MODEL of a beam, showing the plan of making a three-piece beam put together with plain scarphs and coaks, as in use prior to the improvements introduced by Mr. Edye about the year 1836.

123. Two MODELS of beams, one (A.) on the plan described in the preceding MODEL, the other (B.) showing how it may be put together in four pieces when sufficiently large timber cannot be obtained.

124. Two MODELS of beams, one (A.) showing a three-piece beam, complete, put together by being tongued and keyed, as proposed by Mr. Edye, and adopted in H.M.S. "QUEEN," 116 guns, launched at Portsmouth Yard in 1839; the other (B.) showing on a larger scale the details of the plan of so making the beam.

This plan was not brought into general use.

125. Two MODELS of beams, one (A.) showing a three-piece beam, complete, put together by being tongued and keyed on another plan, proposed by Mr. Edye, and adopted in H.M.S. "QUEEN," 116 guns, launched at Ports-

mouth Yard in 1839 ; the other (B.) showing on a larger scale the details of the plan of so making the beam.

This plan has been continued ever since.

126. Represents iron beams, proposed by Mr. George Smart, 1820.

127. Represents a plan for iron beams.

Proposed by Mr. Bell, about the year 1829.

128. Represents an iron beam, for wood ships.

Proposed by Messrs. W. Fairbairn & Co., 1845.

DIVISION H.

KNEES, SHELF-PIECE, WATER-WAY, &c., AND
MODE OF CONNECTING BEAMS TO SHIPS'
SIDES.

141. Four MODELS, (*a, b, c, d.*) representing plans for making knees from straight timber.

Proposed by Mr. Phillips, Carpenter of H.M.S. "PENGUIN," in 1804.

142. Represents the knees made of two straight pieces of timber and two straight iron side plates, as adopted in the "MAIDA," 74-gun ship (late "JUPITER"), captured from the French by Vice-Admiral Sir John Duckworth, on 6th February 1806, off the road of Santa Domingo, West Indies.

143. Represents a plan for making knees from two straight pieces of timber and curved side plates.

Proposed by Mr. J. Hillman, Assistant Master Shipwright, Deptford Yard, 1814.

144. Four MODELS (*a, b, c, d.*) representing the various forms of iron knees that have been adopted at different times for connecting beams to ships' sides.

By Mr. J. Edye.

145. A brass MODEL representing an iron knee to fix under the paddle box beams.

Proposed by Mr. Edwards in 1845, and generally adopted.

146. Represents a plan for connecting beams to ship's side, with iron standard on the deck, secured by eye plates and pins, in practice up to about the year 1806.

147. Represents a method of connecting beams to ship's side, with plates, knees, and chocks.

Proposed by Mr. T. Roberts, Master Shipwright, Pembroke Yard, about the year 1808, and then generally adopted.

148. Represents a plan for connecting beams to ship's side, by shelf-piece and iron hanging and lodging knees.

Proposed about the year 1809 by Sir Robert Seppings, and partially adopted, but not now in use.

149. Represents a plan for securing beams to ship's side, with iron plates crossing the beams and fastenings through the sides of chocks, and binding strake on beams fore and aft, in practice in the early part of the present century.

150. Represents a plan for connecting beams to ship's side, with wood hanging and lodging knees, in practice up to about the year 1810.

151. Represents a plan for connecting beams to ship's side, one beam secured with iron hanging knee, the other with the knee in shape of a cow-horn, with also a thick water-way and a diagonal deck, as proposed by Sir Robert Seppings about the year 1813, and then generally adopted.

152. Represents a plan for connecting beams to ship's side with iron forked knee under the beam, and iron standard on the deck, also four bolts through the ship's side from the side of the beams.

Proposed by Mr. J. Tucker, Surveyor of the Navy, about the year 1828, but not adopted.

153. Represents a plan for connecting beams to ship's side with a chock and straight knee fastened to the side of the beam, and a shelf-piece worked on the plank.

Proposed in 1830 by Mr. S. Read, late Master Shipwright, Sheerness Yard.

154. Represents a plan for connecting beams to the ship's side with a shelf-piece carried home to the timbers, iron knees under the beam, thick water-way, and side binding strake, as proposed and adopted by Mr. J. Edye, Assistant Surveyor of the Navy, in 1833, and in use to the present time, except that the cow-horn and side binding strake have been recently discontinued.

155. Represents a plan for connecting beams to ship's side, with the iron knees under the beams, and chocks behind the knees, introduced about the year 1834.

156. Represents a plan for connecting beams to the ship's side, with a shelf carried home to the timbers, with iron knees, thick water-way, and binding strake, also lug bolts and other fastenings.

Proposed by Mr. O. Lang, Woolwich Yard, about the year 1835.

157. Represents a plan for securing the beams to the ship's side, by allowing the beams to protrude through the outer planking of the ship, one arm of the knee being secured to the outside planking; the channels are built upon the ends of the beams, the knees to the lower deck beams are in some parts brought through the openings of the frame timbers, and secured to the planking under them, in other instances the knees are fastened in a similar way to the upper deck, on the outside planking.

Proposed by Mr. R. Chapman, Carpenter, H.M.S. "ROYAL ADELAIDE," in 1835, but not adopted.

158. Represents a plan for connecting beams to ship's side, with shelf carried home to the timbers, with iron knees, thick water-way, and binding strake, also four lug bolts, and other fastenings.

Proposed by the Committee of Master Shipwrights in 1842.

159. Represents two plans for connecting beams to ships' sides, with iron knees under the beams, with shelf-piece carried home to the timbers, thick water-way and binding strake, knee No. 1 on the ordinary plan, knee No. 2 on a plan proposed by Mr. W. Edye, Master Shipwright, Devonport Yard, in 1852.

160. Represents a plan for connecting beams to the ship's side by an iron dovetail plate.

Proposed by Mr. Parrot in 1861, but not adopted.

161. Represents two plans for connecting iron beams to the sides of a wooden ship.

Proposed by Mr. G. Turner, Master Shipwright, Woolwich Yard, in 1862.

162. Represents a plan for securing beams to ship's side, with wood hanging knees and side binding strake, but without lodging knees.

163. Represents a plan for connecting beams to ship's side, with an iron knee each side of the beam, forming a

hanging knee on one side of the beam, and a lodging knee on the other side.

Proposed by Mr. Blackmoor, Quartermaster in Chatham Yard.

One side of this Model is on the plan of Mr. Roberts. (See No. 147.)

164. MODEL representing beams connected to ship's side by shelf-pieces, chocks, and hanging knees of iron.

165. Represents a plan for connecting beams to ship's side, with iron knees under the beams, with shelf-piece carried home to the timbers, but worked fair with the plank underneath it.

166. Represents the iron beams and plan for connecting them to the ship's side, adopted in H.M.S. "JAMES WATT," 91 guns, launched at Pembroke Yard in 1853.

167. Represents the iron beams and plan for connecting them to the ship's side, adopted in H.M.S. "RATTLESNAKE," 21 guns, launched at Chatham Yard in 1861.

168. Represents the iron beams and plan for connecting them to the ship's side, adopted in H.M.S. "BOMBAY," 81 guns, on being converted from a sailing to a screw ship, at Chatham Yard in 1861.

169. Represents the iron beams and plan for connecting them to the ship's side, adopted in H.M.S. "MYRMIDON," 4 guns, building at Chatham Yard in 1861.

170. Section representing a plan in which chocks can be advantageously fitted between the wooden beams of a ship, to be dovetailed to the water-ways, and shelf-pieces for forming a continuous connexion round the sides of the vessel.

Proposed by Mr. William Ladd, Master Shipwright, Deptford Yard, in 1863, but not adopted.

171. Represents a plan for connecting iron beams to the side of a wooden ship, by means of iron knees and side plates.

172. Five MODELS (A, B, C, D, and E,) sent to the Admiralty in 1851; the two first, A and B, illustrate the system of continuous-frame-bolting, ventilation of timbers for the check of dry-rot, and within-board-arrangement proposed for ships of war by the late Mr. Joseph Tucker, Joint Surveyor of H.M. Navy from 1813 to 1831, whereby the truss-frames, riders, sleepers, steps, crutches, pointers, shelf-pieces, chocks, standards, knees, &c. &c. (painted green in

the Model marked C) would be wholly dispensed with. Mr. Tucker considered that his plan rendered the ship's frame stronger to the resistance of racking, hogging, and twisting as exemplified by the case (see drawing) of H.M.S. "AMETHYST," wrecked in 1811, and that an advantage would be gained by the increased space for stowage and fighting the guns. The use of continuous-frame-bolting was discontinued in 1810, but in after years re-introduced by Sir William Symonds when Surveyor of the Navy, and very generally used. D represents the beam recommended by Mr. Tucker in connexion with the continuous-bolting, and E the mode of its conversion. The beam was never adopted.

DIVISION I.

MODELS OF MORE GENERAL PRINCIPLES IN THE CONSTRUCTION OF WOODEN SHIPS, WHICH CANNOT BE CLASSED UNDER THE FOREGOING HEADS, SUCH AS DIAGONAL RIDERS, &c.

191. MODEL (on a $\frac{3}{4}$ in. scale) of a first-rate ship-of-war (such as the "CALEDONIA" class), the starboard side built upon the old principle of ship-building in use up to about 1814, with standards and riders running square from the keel, and without shelf under the beams, or thick water-way upon the beams.

The port side built upon the improved principle introduced by Sir Robert Seppings about 1814, with diagonal wood riders, longitudinal and truss pieces, thick water-way on the beam and shelf under the beam, truss work between the ports, and diagonal deck, (also showing the round stern and round bow.)

192. A MODEL (on a $\frac{1}{4}$ in. scale), same as the preceding.

193. A MODEL of the starboard side of a 98-gun ship, showing the improvements by Sir Robert Seppings, referred to in the preceding Model.

194. Represents the starboard side of a 46-gun frigate, showing the diagonal wood riders and longitudinal wood truss pieces in the hold, but not between the ports.

Proposed and adopted by Sir Robert Seppings about 1812.

195. Represents the starboard side of a 60-gun frigate, showing diagonal iron rider and thick strakes wrought on the heads and heels of the timbers, also truss work between the ports.

Proposed and adopted by Sir R. Seppings about the year 1827.

196. Represents the port side of an East Indiaman, constructed on the plan described in the preceding Model, showing also the dunnage battens in the hold, as used in merchant ships.

197. Represents a merchant ship constructed on the plan described in the preceding Model, but not showing all the iron riders.

198. MODEL of the larboard side of a ship of the "COLLINGWOOD" class, showing the diagonal iron riders, thick strakes, &c., as adopted by Sir Wm. Symonds in that and other ships.

199. MODEL of a portion of the side of a three-decked ship, showing the same construction as the preceding Model.

200. MODEL of a portion of the side of an 80-gun ship, showing the same construction as the preceding Model.

201. MODEL of a portion of the side of a 50 or 60-gun frigate, showing the same construction as the preceding Model.

202. Represents a plan proposed by Mr. Spiller in 1824, for constructing a ship with a diagonal truss frame, and the planking worked vertically and horizontally. This plan was not adopted.

203. MODEL showing a plan proposed by Mr. J. White of Cowes, for strengthening the side of a merchant ship with iron knees down to lower deck, to enable her to carry guns as a man-of-war.

204. Two MODELS (*a.* and *b.*) showing plans which have been adopted for increasing the breadth of ships when it has been considered desirable to do so.

205. MODEL showing a plan, proposed about 1845, for constructing a ship with an iron frame and wood plank.

206. MODEL of a plan, proposed by Mr. Sharer in 1864, for constructing a ship with double-ribbed iron frames and wood planking.

207. Two MODELS (*a.* and *b.*) showing two plans proposed by Mr. C. Wilcox, Master Shipwright, Deptford Yard, in 1845, for fastening the decks of ships without nails.

208. Represents the diagonal system of constructing ships with only a partial frame, but with three thicknesses of planking worked in different directions.

The "OSBORNE" (late "VICTORIA AND ALBERT"), royal yacht, launched at Pembroke Yard in 1853, was constructed on this plan.

IRON SHIPS.

DIVISION K.

SHIPS' KEELS.

221. Two MODELS (*a.* and *b.*) showing the plan of construction proposed by Messrs. Westwood, Baillie, & Co. for the iron-clad ship of 36 guns designed by them in 1859, but not adopted.

(*a.*) shows the keel, floors, keelson, and garboard strakes; (*b.*) the after part of keel and the inner and outer stern posts.

DIVISION L.

BOW, STERN, AND MIDSHIP FRAMING.

231. A set of MODELS, 4 in No. (*a. b. c. d.*) showing the different forms of iron used in the early period of the construction of iron ships.

232. A set of MODELS, 3 in No. (*a. b. c.*) showing the forms of iron used in the construction of iron ships at the present time.

(*a.*) angle iron; (*b.*) T iron; (*c.*) H iron.

233. MODEL of a section of one side of the "EREBUS," iron floating battery, 16 guns, launched at Glasgow, 19th April 1856, built by Messrs. Napier, showing the plan of forming the frames, keelson, and longitudinal stringers in that vessel.

234. MODEL of a portion of the frame of the "BLACK PRINCE," iron-cased ship, 41 guns, launched at Glasgow, 27th February 1861, built by Messrs. Napier, showing the plan of constructing the fourth and fifth longitudinal frames and the portion of the transverse frames between them in that ship.

235. A set of MODELS, 6 in No. (*a.*, *b.*, *c.*, *d.*, *e.*, *f.*), showing the mode of constructing the frame of the iron-cased ship "WARRIOR," 40 guns, 1,250 horse-power, 6,109 tons. Launched at Blackwall, 29th December 1860. Built by the Thames Iron Shipbuilding Company :—

(*a.*) A MODEL (on a $1\frac{1}{2}$ in. scale) of a section of the "WARRIOR" from the keel to the fourth longitudinal frame, showing the keel, transverse frames, intermediate floors, longitudinal frames, skin plating, bilge pieces, &c.

(*b.*) A MODEL (on a $1\frac{1}{2}$ in. scale) of a section of the "WARRIOR" from the fourth longitudinal frame to the gunwale, (being a continuation of the preceding MODEL (*a.*), and showing the transverse frames as continued up to the gunwale, the fifth and sixth longitudinals, the plating behind the teak backing, the longitudinal stringers, the teak backing, and the armour plates.

(*c.*) A MODEL (on a $1\frac{1}{2}$ in. scale) of the portion of a transverse frame between two longitudinals, showing the mode of constructing the same as high as the fourth longitudinal frame.

(*d.*) A MODEL (made to full size) showing a section of the preceding (*c.*)

(*e.*) A MODEL (made to full size) showing a section of the transverse frames from the sixth longitudinal frame to the gunwale; it also shows a section of the longitudinal frames.

(*f.*) A MODEL (on a $1\frac{1}{2}$ in. scale) of two armour-plates, showing the arrangement of the bolt-holes and the mode of tonguing and grooving them.

236. MODEL of a section of H.M.S. "ACHILLES," 20 guns, 1,250 horse-power, 6,121 tons, launched at Chatham, 23rd December 1863, showing mode of forming the frames in the fore and after bodies.

237. Two MODELS (A. and B.) showing two methods proposed by Mr. Samuda in 1863, for making the armour shelf in H.M.S. "PRINCE ALBERT" of angle iron and flat plates, to obviate the difficulty of obtaining ridge plates of sufficient size and quality to form it in one piece.

238. Stern post and inner post as proposed for the "MINOTAUR" class 1863.

239. (A.) Piece of Atlas iron angle. (B.) Atlas toughened cast steel angle as used in the construction of ships for the frames, &c. 1864.

From the Atlas Steel and Iron Works, Sheffield.

DIVISION M.

SKIN PLATING AND RIVETING.

244. Piece of iron plate showing the plan of riveting the joints together for iron vessels. Received in 1843.

245. MODEL showing the spacing of the rivets in the butts and joints of the plating of H.M. iron-cased ship "ACHILLES," laid down at Chatham Yard in August 1861, and launched in December 1863.

246. MODEL showing the spacing of the rivets in the butts and joints of the plating of H.M. iron-cased ship "BELLEROPHON," laid down at Chatham Yard in December 1863.

247. (A. B. C.) Pieces of Atlas iron plate. (D.) Atlas toughened cast steel, used in the construction of ships for the skin of the vessel.

From the Atlas Steel and Iron Works, Sheffield. 1864.

DIVISION N.

BEAMS AND MODE OF CONNECTING THE SAME TO THE SHIP'S SIDE.

251. Two sections of beams (*a.* and *b.*), showing the mode of constructing the beams by riveting, formerly adopted by the Butterley Iron Company about the year 1858.

252. MODEL of the section of a beam, showing the improved mode of forming the beams by welding, adopted by the Butterley Company about the year 1859.

253. Three sections of beams (*a.* *b.* and *c.*), showing the Butterley Company's improved mode of forming the beams in one piece by rolling.

254. MODEL showing a mode of constructing an iron beam.

Proposed in 1860, but not adopted in Her Majesty's service.

255. A set of MODELS, 3 in No. (*a. b. c.*), showing the mode of forming the beams adopted in the "WARRIOR," iron-cased ship, 40 guns, 1,250 horse-power, 6,109 tons, launched at Blackwall, 29th December 1860, built by the Thames Iron Shipbuilding Company. (*a.*) lower deck beam; (*b.*) main deck beam; (*c.*) upper deck beam.

256. MODEL (full size) showing a plan of connecting iron beams to the ship's side.

Proposed by Messrs. Fairbairn and Company in 1845.

257. MODEL (on 6 in. scale) showing a plan of connecting wooden beams to the sides of iron ships.

Proposed by Messrs. Scott, Sinclair, and Company, in 1846.

258. Plan for connecting the shelf to the under part of iron vessels.

DIVISION O.

MODELS OF MORE GENERAL PRINCIPLES IN THE CONSTRUCTION OF IRON SHIPS WHICH CANNOT BE CLASSED UNDER THE ABOVE HEADS, SUCH AS KEELSONS, LONGITUDINAL STRINGERS, WATER-TIGHT BULK-HEADS, &c.

271. MODEL (on a $\frac{1}{2}$ inch scale) of one side of the midship section of H.M. iron-cased ship "WARRIOR," 40 guns, launched at the Thames Iron Shipbuilding Company's Works in 1860, showing the mode of forming and combining the keel, frames (transverse and longitudinal), box keelsons, skin plating, beams, pillars, wing-passages, bulk-head, armour-plating, backing, &c.

272. MODEL (on a $\frac{3}{4}$ in. scale) of the midship section of H.M. iron-cased ship "DEFENCE," 40 guns, launched at Messrs. Napier and Sons' Works at Govan, near Glasgow, in 1861, showing the mode of forming and combining the

keel, frames (transverse and longitudinal), box keelsons, skin plating, beams, pillars, wing-passage bulkhead, armour-plating, backing, &c., &c.

273. MODEL of a plan proposed by Mr. J. D'A. Samuda, in 1861, for the construction of iron-cased ships. The upper part of the vessel to be made of armour-plating only, without any wood behind it, or ordinary ship-plating or framing, the armour plates to be 6 in. in thickness, and to be united to each other at their edges by means of scarphs, and riveted through the scarphs to a longitudinal double-flanged plate on the inside.

274. MODEL of a plan proposed by Mr. J. D'A. Samuda, in 1861, for the construction of iron-cased ships, so that the wood backing may be dispensed with, and the armour plates incorporated into the structure of the ship.

275. MODEL of a plan proposed by Captain Julius Roberts, in 1862, for the construction of shot-proof ships.

276. MODEL of a plan proposed by Mr. M. B. Hewson, in 1862, for the construction of iron gun boats, the ship's side between the upper and main decks being hinged at the upper, lower, and middle parts, so that the sides and upper deck may be lowered to the lower deck, and below the water-line, for immersing the ship preparatory to going into action, or raised to their proper position for increasing her displacement, and thereby diminishing her draught of water.

277. MODEL of a plan proposed by Messrs. G. F. Jones and J. Jones, in 1862, for the construction of shot-proof ships with flange plates and oval top sides.

DIVISION P.—Plans for fastening Armour Plates, including Bolts, &c., for that Purpose; also Models showing the Arrangement of Armour Plates.

300. Plan of screw bolts for fastening armour plates. (a.) Shows the bolt, with nut and wedge, for opening the inner end of the bolt, also conical head about $\frac{1}{4}$ larger than at the other part. (b.) Shows the bolt finished with a square and hexagonal head, nut, and wedge for opening the bolt.

Proposed by Mr. F. Johnson. 1861.

301. Four patterns (three wood and one iron), showing a plan of bolts for fastening armour plates. (*a.*) represents the size of the bolt, with the wedges placed ready to open the head of the bolt. (*b.*) represents the size of the bolt, showing the wedges driven home. (*c.*) shows a part of the iron bolt and iron wedge at the head of the bolt. (*d.*) shows both the plate and bolt when secured to the ship's side.

Proposed by Mr. G. Turner, Master Shipwright, Woolwich Yard. 1862.

302. Plan of a screw bolt for fastening armour plates, with a conical head and a nut and screw point.

Proposed by Mr. G. Doherty. 1862.

303. Plan of a wire bolt for fastening armour plates.

Proposed by Mr. C. Burn. 1862.

304. Pattern armour plate bolt as used in H.M.S. "AGINCOURT," building by Messrs. Laird, Birkenhead, 1864.

305. Plan for securing armour plates by means of studs with **T** heads formed on the inside of the plates; these studs to be dropped into corresponding mortices in large cylindrical heads worked on the fastening bolts, and the bolts then hove up tight by nuts and screws on the inner ends.

Proposed by Mr. F. Norrington. 1861.

306. Plan for armour plates in two thicknesses.

Proposed by Mr. G. Bulbeck. 1861.

307. Plan for attaching armour plates to a backing of wood.

Proposed by Lieut.-Colonel Alexander, R.M.A. 1861.

308. Plan for fastening armour plates.

Proposed by Mr. W. Easthope. 1861.

309. Plan for fastening armour plates.

By Mr. Thomas Loney. 1861.

310. Plan for fastening armour plates, showing screw eye bolts, passing from the inside of the ship through the skin plating, and secured on the edge of the plates by pins passing through the eye of the bolts.

Proposed by Mr. D. Beale. 1861.

311. Plan for securing armour plates the edges being bevelled.

Proposed by Mr. Thos. George. 1861.

312. Plan of armour plates for a shot-proof ship.

Proposed by Mr. W. Haggett. 1861.

313. Plans for armour plating.

Proposed by Mr. George Cooke, Newcastle-on-Tyne. 1861.

314. Set of MODELS, by Mr. G. G. Lenox. 1862.

- (a.) Portion of three plates connected together by dovetailed plates and bolts.
- (b.) Plan of the dovetail.
- (c. & d.) Two plans for the bolts.
- (e.) Metal dovetail.
- (f.) The bolt in the plate.
- (g.) Plan of making the bolt.

315. Plan for securing armour plates, the plates being placed vertically instead of longitudinally, and secured by means of flanges and grooves.

Proposed by Messrs. Morison & Co. 1862.

316. Plan of armour plating, and of fastening the same to the ship's side.

Proposed by Mr. Westley Richards. 1862.

317. Plan for fastening armour plates, the butts being dovetailed into each other.

Proposed by Mr. J. Wright. 1862.

318. Plan of armour plating in two thicknesses, one overlapping the other, and fastened by means of bolts through the overlapping edges.

Proposed by Mr. J. B. Love. 1862.

319. Two models to show an alteration in the mode of fitting the edges of armour plates to save labour in planing.

Proposed by Mr. J. Trickett. 1862.

320. Plan for flanged armour plates of a long hexagona form, and the mode of fastening them.

Proposed by Mr. G. Gill. 1862.

321. Section of an armour-plated ship, showing two thicknesses of diagonal planking of 8 inches each, and one thickness of vertical timber of 13 inches, and wood planking inside $3\frac{1}{2}$ inches, with $\frac{5}{8}$ iron-plating between the diagonal and inside work; also longitudinal stringers to which the armour plates are fastened by short screw-bolts, the stringers being let into the vertical timbers; the armour plates between the stringers are secured by bolts on the edges of the plates.

Proposed by Mr. H. L. Peake. 1862.

322. Plan for fastening armour plates, showing the screw bolts driven from the inside of the ship, and secured on the outside by nuts. Proposed by Mr. J. H. Row. 1862.

323. Plan for fastening armour plates by means of lugs formed on the inside of the plates, and attached by pins to shackle-headed bolts. Proposed by Mr. J. H. Row. 1862.

324. Plan for securing armour plates, by means of dovetailed bolts at the butts and edges secured inside with nuts. Proposed by Mr. D. Beale. 1862.

325. Plan for fastening vertical and horizontal armour plates with dovetail grooves, screw-bolts, and nuts. Proposed by Lieut. H. Knox. 1862.

326. Plan for connecting armour plates together by means of bolts passing through flanges formed on the ends of the plates. Proposed by Messrs. Samuelson & Co. 1862.

327. Plan for securing armour plates. Proposed by Mr. Stephen Perry, Plaistow. 1863.

328. Plan for securing armour plates by means of dovetailed bolts at the joints, secured inside with nuts and washers. Proposed by Mr. T. W. Miller. 1863.

329. Plan for connecting armour plates to those adjacent by means of dovetail keys fitting into grooves in the butts and edges. Proposed by Mr. C. E. Albrecht. 1863.

330. Plan for securing armour plates, the fastenings being all covered by the edges overlapping. Proposed by Mr. T. Mellard Reade, C.E. 1863.

331. Section showing a plan for securing armour plating on wood backing, with longitudinal rabbeted stringers secured to the vertical backing by screws; the armour plates having rabbeted edges to fit into the stringers. Proposed by Mr. J. Watts. 1862.

332. Plan for securing armour plates, showing the wood backing stringers made in two thicknesses; the inner portion of the stringer with two flanges and square edge, the outer portion showing dovetailed edges corresponding to the edges of the plates, having large screws passing through the stringers into the vertical backing which secures the plates. Proposed by Mr. H. L. Peake. 1862.

333. Plan for armour plating. By Mr. R. F. E. Morrison. 1862.

334. Plan for armour plating. Proposed by Mr. Westley Richards. 1862.

335. Plan for armour plating, showing the wood backing, plates, and bars rabbeted over the edge of the plates, the whole being secured with bolts screwed into the bars from the inside.
Proposed by Mr. L. Hill. 1862.

336. Plan for armour plating, showing conical bars secured to the backing by dovetailed plates.

Proposed by Mr. J. Haley. 1862.

337. Three different plans for armour plating.

(a.) Representing conical and longitudinal plates.

(b.) and (c.) Showing dovetailed and rabbeted plates.

By Mr. J. F. Roberts. 1862.

338. Plan for armour plating. The plates are put back to back, forming tube plates, the spaces between each tube being filled in with circular bar plates and riveted together with round head rivets.

Proposed by Mr. J. S. O. Jones. 1862.

339. Plan for armour plating.

Proposed by Mr. Westley Richards. 1862.

340. Plan for armour plating.

Proposed by Mr. H. Dawes. 1862.

341. Plan for armour plating.

Proposed by Mr. H. N. Crelling, junior. 1864.

342. Pattern showing the tonguing and grooving of a full-size armour plate.

343. Plan for armour plating ships of war.

By Mr. W. Warrington. 1864.

344. Piece of rolled armour plate, $4\frac{1}{2}$ inches thick, taken from a plate made for H.M.S. "WATERWITCH," and broken to show the fibrous nature and quality of the iron.

Manufactured at the Atlas Steel and Iron Works, Sheffield. 1864.

345. Piece of rolled armour plate, $5\frac{1}{2}$ inches thick, taken from a plate made for H.M.S. "ROYAL SOVEREIGN," and broken to show the fibrous nature and quality of the iron.

Manufactured at the Atlas Steel and Iron Works, Sheffield. 1864.

346. Piece of rolled armour plate, 6 inches thick, taken from a plate made for a cupola for the Belgian Government.

Manufactured at the Atlas Steel and Iron Works, Sheffield. 1864.

- 347.** Shavings planed from the edges of an armour plate, showing the quality of material and strength of cut.
From the Atlas Steel and Iron Works, Sheffield. 1864.

DIVISION Q.

PLANS FOR RENDERING SHIPS SHOT-PROOF.

- 380.** Plan to protect the side of a ship, by slinging the hammocks on the outside.

Proposed by Mr. W. H. Brown. 1855.

- 381.** Two MODELS, (A. and B.,) showing a substitute for armour plating, formed of homogeneous metal or of iron linked together.

Proposed by Mr. J. B. Howell. 1860.

- 382.** Plan for constructing a shot-proof ship of frames alternately of wood and iron.

Proposed by Mr. S. P. Cornish. 1860.

- 383.** Plan for a semi-circular metallic-plated ship of war.

Proposed by Mr. C. J. Grant, Tottenham Court Road. 1861.

- 384.** Section of a shot-proof ship, showing timbers with iron between, and inside and outside planking.

Proposed by Mr. H. Spratt. 1861.

- 385.** Plan for a shot-proof ship, with a backing of steel springs.

Proposed by Mr. William Williams. 1861.

- 386.** Plan for a shot-proof ship, being a combination of wood and iron placed diagonally over the outside planking.

Proposed by Mr. Hargrave. 1862.

- 387.** Design for an iron cased ship.

Proposed by Mr. H. Harris. 1862.

- 388.** Plan for armour plating, showing skin plating, wood backing, and bar plates riveted together for the armour plating, and secured internally by forelocks.

Proposed by Mr. S. Gaunt. 1862.

389. Plan for a shot-proof ship, showing the plating laid edgewise, horizontally and vertically.

Proposed by Mr. J. Robertson. 1862.

390. Section, (on a 3 in. scale,) showing a plan for introducing rolled bars of iron from 6 in. to 7 in. thick by 10 in. deep instead of plates secured to the skin plating of $\frac{1}{2}$ inch thickness, by a rolled flange at the back of the plate, and fastened with screws. Proposed by Mr. J. Watts. 1862.

391. Plan for a shot-proof ship, showing spikes projecting from the plates.

Proposed by Mr. T. Randell. 1862.

392. Plan for a shot-proof ship.

By Mr. C. Falek. 1862.

393. Two Models, showing a plan for the construction of shot-proof ships. Proposed by Mr. J. M. Hyde. 1862.

394. Model of a plan for the construction of shot-proof ships, the sides to be covered with a series of iron plates or shutters, hinged at about the height of the main deck, and worked by means of windlasses. The shutters are intended to present an inclined surface for the shot to strike upon, and so to render them less liable to do injury to the ship.

Proposed by Mr. W. J. Marshallsay. 1862.

395. Plan of cork backing for armour plates.

Proposed by Mr. W. H. Robinson. 1862.

396. Plan for armour plating with hinged joints on a backing of spiral springs.

By Mr. G. Sturmer. 1862.

397. Section of a shot-proof ship.

By Mr. J. Thomson. 1862.

398. Plan for rendering a ship shot-proof by means of armour plates suspended by india-rubber cords, so as to give them elasticity, and thereby increase their power of resistance to the force of a shot.

Proposed by Mr. J. White, Finchley. 1862

399. Three specimens of Bielefield's "Fibrous Slab" for use in the construction of iron-cased ships as a backing for armour plates, &c.

Proposed by Commander R. Scott. 1862.

400. Specimen of backing for armour plates composed of layers of cork cemented to the wood backing, and the armour plates cemented to the cork.

Received from Mr. H. Grissell. 1862.

401. Plan for a shot-proof ship, showing rollers fitted to the ship's side to revolve.

Proposed by Mr J. E. Oliver. 1863.

402. Plan of a shot-proof ship, showing sides and stern fitted with half round bars of iron. By Mr. W. Gardner.

403. Midship section, showing a plan for the construction of a ship with tubes for the enemy's shot to pass through.

Proposed by Mr. G. Ellis. 1864.

404. Section showing a proposed plan for the construction of a shot-proof ship with a double compound backing, the armour plates vertical, and secured by rabbets to T-irons, &c.

405. Sample of proposed tube armour for ships.

By Mr. J. White. 1864.

406. Plan for the construction of a shot-proof ship.

Proposed by Mr. H. Harris. 1864.

407. Plan for attaching wood backing and armour plates to an iron ship after she has been built, should it be desired to render her shot-proof. The Model shows the plan for attaching the backing.

Proposed by Mr. W. R. Mulley. 1864.

408. Specimen of millboard intended to be used as a backing for armour plates to render ships shot-proof.

Proposed by Mr. W. H. Morris. 1864.

409. Plan for constructing a shot-proof ship, parts of the timber or planking being arranged to form arches in the spaces between the ordinary frames.

Proposed by Mr. R. H. Reeves. 1864.

410. Plan for the construction of ships of war, land and marine batteries. Proposed by Mr. G. Davis. 1864.

411. MODEL (on a 3 inch scale) of a plan for a compound backing for armour plates.

Proposed by Mr. J. Chalmers. 1864.

CLASS V.

Models showing the Mode of fitting various Parts
of Ships.*Divisions.*

A.—Hawse holes.	H.—Ship's side and port scuttles, and mode of securing them.
B.—Catheads, and modes of fitting them.	I.—Ventilation of ships, air tubes, &c.
C.—Magazines, magazine passage lights, &c.	J.—Scuppers.
D.—Cabins and their fittings, such as louvre and venetian frames, bulkheads, cants, &c.	K.—After parts of ships, showing the arrangements necessary in connexion with the screw propeller, and to enable it to be raised.
E.—Hatchways and skylights, with coamings, &c.	L.—Shot-proof conning houses.
F.—Port sashes, and their mode of fitting.	M.—General internal arrangements of ships.
G.—Plans for fitting ports, half-ports, and for raising and securing the same.	

DIVISION A.

HAWSE HOLES.

1. Plans for making a bow port of the second hawse hole of a 74 gun ship.

Proposed by Mr. Richard Carter, Chatham Yard.
1824.

2. Plan for fitting the bow port as a hawse hole.

Proposed by Sir W. Symonds, and adopted in H.M.S.
"BONETTA." 1836.

3. Represents the position of the hawse holes; also a plan for making breast hooks and crutches of straight timber, by combining iron with wood, (on a $\frac{1}{2}$ in. scale).

Proposed by Sir Robt. Seppings.

4. Three MODELS. A. shows the position of the hawse holes; B. shows a plan for substituting the second hawse hole on the lower deck for a port; C. shows a plan for substituting the first hawse hole on the main deck, for a port.

Proposed by Mr. R. Blake.

5. Plan for fitting the hawse hole and plugs.

Proposed by Mr. G. L. Ford, Carpenter, H.M.S.
"GANGES," and fitted to that ship in 1858.

6. Plan for a solid iron hawse plug for iron-cased ships in time of action, (on a $\frac{1}{2}$ in. scale,) as fitted to H.M.S. "ROYAL OAK" and others. 1862.

7. Plan for making cheeks secured by metal bracing plates, for a 74 gun ship.

Proposed by Mr. J. Hillman, Assistant Master Shipwright, Deptford. 1814.

This plan shows the conversion of straight timber into cheeks, breast hooks, knees, crutches, &c., whenever compass timber is not available for the same.

DIVISION B.

CATHEADS, AND MODES OF FITTING THEM.

20. Section of a bow, showing a plan for fitting the cathead, by scarphing the same.

Proposed by Mr. W. Plucknett. 1800.

21. Section of a bow, showing a plan for fitting the cathead, the inner end secured under the beams.

Proposed by Mr. W. Plucknett. 1800.

22. Section of a bow, showing a plan for fitting the cathead; also a plan for a chain shank painter.

Proposed by Sir Robt. Seppings. 1816.

23. Foremost section of a mooring lighter, showing the davit for carrying the anchor without the platform.

Proposed by Sir Robt. Seppings.

24. Two sections: one showing a plan for fitting the cathead, and letting go the shank painter by means of a rope; the other, the plan of letting go the shank painter by means of a lever.

The latter plan proposed by Mr. Spencer, Chatham Yard. 1820.

25. Section of a bow (starboard side), showing a plan for fitting the cathead; also a plan for catting anchors by a short pennant shackled. 1833.

26. Plan of a cast iron stopper cleat for cathead.

Proposed by Mr. Sturdee, Portsmouth Yard. 1834.

27. Section of a bow of a two-decked ship, showing a plan for fitting the cathead; also for letting go the spare

and sheet anchor from the after part of the foremost channel.

Proposed by Mr. C. Brown, Assistant Master Attendant, Portsmouth Yard. 1844.

28. Foremost section of a mooring lighter, showing the davit for carrying the anchor; also, a platform attached to the davit for the better performance of the duty during the time of mooring a ship, or laying moorings.

29. Two Models, showing a plan for fitting the catheads, also for letting go the shank painter.

Proposed by Mr. W. Warner, Shipwright, Portsmouth Yard.

This plan was adopted in H.M.S. "GALATEA." 1826.

30. Plan for fitting the cathead, also the lever for letting go the shank painter, (scale $\frac{1}{2}$ ths of an inch).

Proposed by Captain Burton, R.N.

31. Two iron catheads, as fitted to H.M.S. "INTREPID:" (A.) showing three brass shivers let in to the head, secured by means of a screw bolt and nut, as originally fitted to the ship; the other, (B.) an iron bound block with three brass shivers secured to the head by a swivel bolt, as altered at Malta Dock Yard by Mr. William Ladd, and now generally adopted.

32. Cathead, with plan for letting go the anchor.

By Lieutenant Green, R.N.

33. Iron cathead for iron-cased ships, made of $\frac{3}{4}$ in. plate and $\frac{1}{2}$ in. angle iron (wrought), and plan for securing it to the ship.

Proposed by Mr. J. Binsted. 1861.

34. Full sized patterns of toggles and levers for letting go shank painters and anchors.

35. Plans for letting go the shank painter and stopper.

Proposed in 1819.

36. Three levers for letting go shank painters.

Proposed by Mr. Pellars.

DIVISION C.

MAGAZINES, MAGAZINE PASSAGE LIGHTS, &c.

50. Passage light, as fitted in the year 1801 (now disused).

51. Magazine, as fitted to H.M.S. "THUNDERER." 1836.

- 52.** Magazine. Proposed by Mr. J. Edye. 1840.
- 53.** Bulkhead, as fitted to the breadroom and magazine of H.M.S. "COLLINGWOOD." 1844.
- 54.** Magazine light. 1844.
- 55.** Magazine light. 1844.
- 56.** Magazine tell-tale, or charge indicator, as fitted to the fore magazine of H.M.S. "VENGEANCE."
Proposed by Lieutenant Jenner, and adopted in that ship. 1846.
- 57.** Indicator for magazines, as fitted to H.M.S. "St. VINCENT," and afterwards generally adopted (on a 2 in. scale).
Proposed by Mr. Williams, Portsmouth Yard. 1852.
- 58.** Plan of scuttle lids for entrance doors and bulkheads in magazines, as fitted to ships at Devonport prior to the improved plan ordered to be generally adopted in 1850.
- 59.** Magazine revolving lantern. 1853.
- 60.** Magazine indicator.
Proposed by Mr. W. Lee in 1863, but not adopted.
- 61.** Magazine as fitted, showing the entrances to it, the light-room, and the arrangement of the tiers for the powder cases. 1850.

DIVISION D.

CABINS AND THEIR FITTINGS, SUCH AS LOUVRE AND VENETIAN FRAMES, BULKHEADS, CANTS, &c.

- 80.** Part of deck, showing a plan for fitting the cants to cabin bulkheads of all ships, so as to avoid taking down the cabins when the decks require caulking (on a 6 in. scale). 1814.
- 81.** Piece of bulkhead, showing a plan for a moveable cant.
Proposed by Mr. Hawkes. 1829.
- 82.** Piece of deck, showing a plan for securing the cant to the deck by means of a hook and eye.
Proposed by Mr. Hawkes, and ordered to be tried on board H.M.S. "PRINCE REGENT." 1829.
- 83.** Section of a ship, showing part of the ship's side, thwartship bulkhead, deck, and the cant secured to the deck, and the plan for the speedy removal of the bulkhead

and cant in case of action, or canlking the deck (on a $1\frac{1}{2}$ in. scale). Proposed from Sheerness Yard. 1848.

84. Five pattern cants for cabin bulkheads, showing the method of securing the cants to the deck.

Proposed from Pembroke Yard. 1848.

85. Part of a thwartship bulkhead, shelf, frieze, spurn-water and cant, showing the plan for removing the spurn-water from the cant to displace the bulkhead (on a 2 in. scale).

Proposed from Chatham Yard. 1849.

86. Part of a thwartship bulkhead, showing the frieze, shelf, spurnwater, cant, and a portion of the deck. One half of the model shows the plan for removing the bulkhead and cant, by displacing the spurnwater from the cant; the other half the bulkhead as a fixture.

Proposed from Portsmouth Yard. 1849.

87. Model showing the full-size cant, and part of the deck, and the plan for fixing or removing the cant from the deck. 1849.

88. Sliding bulkhead for the captain's cabin, athwartships on the fighting decks.

By Mr. W. Edye. Ordered to be generally adopted in 1849.

89. Piece of the deck and cant, showing the plan for securing or removing the same from the deck.

Proposed by Mr. Kneebone in 1850, but not adopted.

90. Plan for securing the bulkhead to the cants by pins.

91. Sliding panels for cabins.

92. A cabin with all the interior equipments, viz., drawers, sleeping cot, book shelves, table, and wash-stand, as fitted to all ships in the Royal Navy.

93. Rotunda erected on the deck, and the grand staircase leading to the principal state rooms, as fitted to H.M. Royal Yacht, "VICTORIA and ALBERT," now "OSBORNE."

94. Frame fitted with glass louvres for cabins.

Proposed by Messrs. Fairs and Baillie, patentees, London. 1840.

95. Three venetian frames for cabins, showing a plan whereby when blinds are intended to slide, or to be fitted to sliding doors, the brass fittings should be made for them.

96. Lower part of a frame, as fitted to store-rooms below.

DIVISION E.

HATCHWAYS AND SKYLIGHTS, WITH
COAMINGS, &c.

110. Part of the deck, showing the plan for fitting the main hatchway to flush deck vessels; also, for securing the hatches in the event of rough weather. The green circles show the places for illuminators to be fitted in the scuttles.

Proposed by Lieut. E. Jennings, R.N., and fitted to H.M.S. "ALERT." 1842.

111. Plan for fitting a main hatchway to a convict ship. 1851.

112. Conical circular skylight.

Proposed by Mr. John Bennett, Joiner, Woolwich Yard, and adopted in the Royal Navy. 1845.

113. Plan for making all the skylights on board flush deck ships, in the neighbourhood of the capstan and chain messengers, so that in bad weather a skylight might be instantly transposed into a cap scuttle, and thus dispense with dead-lights (on a 2 in. scale).

Sheerness Yard. Adopted in the "NIMROD," 1856; and subsequently in the "CORMORANT," "RACE HORSE," "STAR," and other vessels.

114. Skylight, constructed for the preservation of choice foreign plants, on their passage to England, (on a 2 in. scale).

115. Two illuminators to be fitted to the scuttles of hatchways.

116. Skylight for upper deck.

117. Piece of deck with fore and main hatchways.

118. Hatchway, showing a plan for increasing the depth of coamings, which can be unshipped (if required).

DIVISION F.

PORT SASHES, AND THEIR MODE OF FITTING.

140. Plan for fitting the sashes and dead-lights in the stern and quarter ports on the middle deck of H.M.S. "PRINCE REGENT," Chatham, (scale $1\frac{1}{2}$ in.). 1828.

141. Sections of sterns, showing different plans for fixing the sashes and dead-lights to the ports.

Proposed by Mr. W. Edye. 1837.

142. Section of a stern, showing the sash and half-port, fitted with dead-light.

Proposed by Sir W. Symonds, and adopted in the "INDEFATIGABLE." 1843.

143. Plan of a sash and dead-light for a stern port, (on a 3 in. scale.) Sheerness Yard. 1848.

144. Plan for sashes and dead-lights to be fitted to stern ports.

Proposed and adopted in H.M.S. "COLOSSUS." 1848.

145. Stern sashes and dead-lights of the "INDEFATIGABLE."

Fitted on Mr. W. Edye's plan, by which all frigates were proposed to be similarly fitted. 1848.

146. Plan for fitting sashes and dead-lights to 80 gun ships. 1849.

147. Plan for fitting a dead-light to stern ports.

Proposed from Portsmouth Yard, and fitted in H.M.S. "ST. VINCENT." 1849.

148. Plan for fitting sashes and dead-lights to stern ports, as ordered to be generally adopted in 1849.

149. Mode of fitting stern sashes and dead-lights to frigates. Chatham. 1849.

150. Two sections of sterns, showing Mr. Walker's plan for fitting the sashes and dead-lights to stern ports. 1851 and 1852.

151. Plan for fitting doors to stern walks

By Mr. Walker, Portsmouth Dockyard. 1852.

152. Plan for fitting a sash and dead light to stern ports.

Proposed by Mr. J. Oram, and adopted in the "LIFREY." 1855.

153. Plan for fitting dead-lights to stern. 1859.

154. Plan for fitting the stern sashes and dead-lights of two-decked ships. Adopted in ships of that class. 1860.

DIVISION G.

PLANS FOR FITTING PORTS, HALF-PORTS, AND
FOR RAISING AND SECURING THE SAME.

170. Plan for raising and securing port lids in commissioned or ordinary ships.

Proposed by Mr. Nicholas Trinaman, Shipwright, Plymouth Yard. 1803.

171. Plan for raising and securing port lids.

Proposed by Vice-Admiral Berkeley. 1806.

172. Plan for securing port lids, with screws and plates.

Proposed by Sir Henry Peake. 1806.

173. Plan for barring in port lids.

Proposed by Mr. Thos. Burkitt, Modeller, Chatham Yard.

174. Port bar, for securing ports.

175. Plan for barring in ports. By Sir W. Ommanney.

176. Plan for raising and barring in temporary port lids, fitted to ships in ordinary.

Proposed by Mr. Symonds, Carpenter of H.M.S. "OCEAN," and approved of by the Admiralty. 1822.

177. Plan for raising port lids with iron chain and lever.

Proposed by Mr. J. Peake. 1825.

178. Two MODELS showing plans for fitting ports and topsides of 10 gun brigs. Proposed by Mr. J. Peake. 1828.

179. Plan for fitting the lower and upper half-ports of gun brigs.

Proposed by Mr. Wm. Buck, Shipwright, Chatham Yard. 1829.

180. Plan for fitting the bow-port of H.M.S. "BONNETTA." 1829.

181. Port as fitted in the "SNAKE," 16 gun brig, showing the staple or crank for the bar to fit in for raising and lowering the port lid. 1831.

182. Plan for raising and lowering port lids by chain and lever fixed under the beam.

Proposed by a Warrant Officer of Woolwich Yard. 1836.

183. Three MODELS, showing two plans for fitting port-lids to ships in ordinary (on a 2 in. scale).

Proposed by Mr. W. Stone, Chatham Yard. 1836.

184. Two MODELS, showing plans for raising and lowering port-lids to ships in ordinary.

Proposed by Mr. Oliver Lang, Master Shipwright, Woolwich Yard. 1842.

185. Plan for a port-lid. 1843.

186. Plan for fitting port-lids to ships in ordinary.

Proposed by Mr. Oliver Lang. 1844.

187. Plan for a port, and two eyes for a port sweep. 1845.

188. Two MODELS, showing a plan for barring in port-lids. Also a plan for ventilating the ship by air pipes fixed to the side of the port timber. One model by removing the planking shows the plan from the outside of the ship, the other from the inside. (See also Division I.) 1847.

189. Plan for barring in ports. 1848.

190. Plan for barring gun-deck ports. 1850.

191. Two MODELS, showing a plan for securing gun-deck ports without a port bar, as fitted to H.M.S. "St. VINCENT" and "WATERLOO" for trial.

Proposed by Mr. Bateman. 1851.

192. Plan of port bars, for securing the ports.

Proposed by Mr. R. Kneebone. 1852.

193. Port, showing three distinct plans of port hooks for securing the port-lids (scale $1\frac{1}{2}$ in.). 1859.

194. Plan for securing lower deck ports by means of breast-pieces, the sweep-piece to answer as a port bar, ordered to be tried in H.M.S. "QUEEN."

Proposed by Mr. Lemon, Quarter-master, H.M.S. "EXCELLENT." 1859.

195. Plan for unbarring lower deck port-lids.

Proposed by Mr. Ford, Carpenter, H.M.S. "GANGES." 1860.

196. Plan for an iron port-lid to open horizontally.

Proposed by Major-General J. G. Woodford. 1862.

197. Iron port secured by cross plates inside.

Portsmouth Yard. 1862.

198. Metal hinge for the lower half ports of iron-cased ships.

Proposed by the officers of Portsmouth Yard in 1863, and ordered to be generally adopted.

199. Plan for raising port lids by chain and crank fixed to the side of beam.

Proposed by Mr. G. Turner.

200. Seven patterns (three of metal and four of wood), showing plans of flanges for port ropes or chains.

Proposed by Mr. J. Edye.

201. Part of a port and sweep piece.

202. Specimen of Fuller's improved water-tight india-rubber beading for port-holes and lids, deck lights, scuttles, and other openings on board ship, ordered to be fitted for trial in 1864.

203. Specimen of Fuller's water-tight india-rubber beading (for the purpose stated in the preceding description, No. 202), proposed as an improvement on the previous plan.

By Mr. W. C. Fuller. 1864.

DIVISION H.

SHIP'S SIDE AND PORT SCUTTLES, AND MODE OF SECURING THEM.

220. Port scuttle and slide to the illuminator.

Proposed by Mr. W. Hayea. 1813.

221. Plan for a ship's scuttle and metal slide. 1822.

222. Pattern scuttle, with two bars jointed, nut and screws, as in use prior to the introduction of Lang's tube scuttles in 1823.

223. (A.), a pattern circular tube scuttle, with nuts, screws, and spanner attached, showing the mode of securing the same, now generally adopted and commonly known as Lang's tube scuttles; (B.), a small model of the same.

Proposed by Mr. O. Lang. 1823.

224. Plan for a cast-iron ventilating illuminator, working upon a pivot. 1830.

225. Two metal side scuttles, one with the glass fitted to the scuttle, the other with a metal hinge flap, also showing the plan for securing the same.

Proposed by Mr. Zechariah Hamblen, Engine Maker, Portsmouth Yard. 1833.

226. Part of a gun-deck port-lid of a line-of-battle ship, with air scuttle and bar and screw.

Proposed by Mr. Henry Bois. 1834.

227. Plan of a metal frame for a ship's side scuttle.

Proposed by Mr. Parsons. 1834.

228. Plan for securing the scuttles in a ship's lower ports.

Adopted on board H.M.S. "HASTINGS," Portsmouth. 1834.

229. Plan for a metal screw scuttle.

Proposed by Lieut. Cook, R.N. 1837.

230. Plan for fitting a scuttle and metal port to steam vessels.

Proposed by Mr. J. Edye, and adopted. 1838.

231. Plan for a port scuttle.

Proposed by Mr. J. Edye, and adopted in H.M.S. "HECATE" and "HECLA." 1839.

232. Plan for a metal port scuttle.

Proposed by Mr. John Merralls, Leading Man of Shipwrights, Chatham Yard. 1839.

233. Plan for a tube scuttle. 1843.

234. Part of a wood pattern for a scuttle.

Proposed by Mr. R. Blake. 1845.

235. Plan for a short pipe or tube scuttle. 1854.

236. Plan for a metal frame and sash to be fitted inside the port. 1854.

237. Plan for a scuttle.

Proposed from Sheerness Yard. 1860.

238. Plan for plugging tube scuttle holes in iron-plated wood-built ships. Pembroke Yard. 1862.

239. Two plans for plugging tube scuttle holes, in iron-plated wood-built ships. Portsmouth Yard. 1862.

240. Plan for plugging tube scuttle holes, in iron-plated wood-built ships. Woolwich Yard. 1862.

241. Plan for plugging tube scuttle holes, in iron-plated wood-built ships. Sheerness Yard. 1862.

242. Plan for plugging tube scuttle holes, in iron-plated wood-built ships. Devonport Yard. 1862.

243. Plan for plugging tube scuttle holes, in iron-plated wood-built ships. Chatham Yard. 1862.

244. Plan for plugging tube scuttle holes from inboard in iron-plated wood-built ships (on a 2-in. scale).

Proposed by Mr. J. Watts. 1862.

245. Plan for an improved mode of fitting scuttles, proposed from Portsmouth Yard for ships of the "FALCON" class, but not adopted. 1864.

246. Ventilating illuminator. By Messrs. Pellatt & Co.

- 247.** Scuttle for inside port.
248. Scuttle rim.
249. Plan of screw-plug and light for tube scuttles in armour-plated ships,
Proposed by Mr. E. Elliott, Foreman, Portsmouth. 1864.
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DIVISION I.

VENTILATION OF SHIPS, AIR TUBES, &c.

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- 270.** Section of a frigate, showing the plan for opening and shutting the louvres (in the strake left out for air); also for securing them to the shelf-piece from within board (on a 3-in scale).
Proposed by Mr. W. Weekes, Chatham Yard, for ships in ordinary. 1834.
271. Three copper ventilating tubes. 1840.
272. Plan for a ventilating tube, or windsail. 1846.
273. Plan of iron louvres for ventilation.
Proposed by the Rev. R. B. Greenlaw, Blackheath. 1846.
274. Pattern iron tube to be put down through the deck of a ship, when Mr. Wm. Warrington's exhausting machine is used for ventilation, to prevent the air caused by the machine descending too strongly.
Proposed by Mr. Wm. Warrington. 1846.
275. Plan for a ventilating tube.
276. Two plans; one for an iron scuttle, to be used in the deck over the coal bunkers; the other for a grating to be placed for ventilation on removing the scuttle in fair weather. 1848.
277. Plan for a ventilator.
Proposed by Mr. Sherringham. 1850.
278. Two ventilators. 1852.
279. Metal ventilator.
Proposed by Mr. G. Wells. 1853.
280. Two MODELS shewing a plan of ventilation proposed by Mr. Watson. 1859.

281. Section (on a $\frac{3}{4}$ in. scale) of a gun-boat of H.M.S. "HANDY" class, showing the method of ventilation proposed for this class of vessel by the Committee on Ventilation in 1861.

282. Section (on a $\frac{1}{2}$ in. scale) of a line-of-battle ship of the "GIBRALTAR" class, showing the plan of ventilation proposed by the Committee on Ventilation for ships of this class in 1861.

283. Half MODEL of H.M.S. "ROYAL OAK," showing the method of ventilating the lower deck and the lower deck cabins. 1862.

284. Section of a ship, showing a plan for fitting an air-trunk inside, so as to communicate a free circulation of air to the openings between the timbers.

285. Plan for a cast-iron circular frame, to be fixed in the deck, to admit air into the ship below.

286. Plan for ventilating the ship by air pipes fixed to the side of the port timber. 1847.

(This model will be found at No. 188, Division G. in this Class.)

287. Bellows pump for extracting foul air from between decks.

Proposed by Commander R. H. Fleming, H.M.S. "OCEAN."

288. Pump for pumping out foul air from between decks. Proposed by Dr. Arnott. 1843.

DIVISION J.

SCUPPERS.

310. Plan for fitting the scupper through the deck and ship's side, as referred to in a letter from Rear-Admiral Sir Thomas Louis of 9th June. 1806.

311. Plan for a scupper, intended to be fitted to the upper decks.

Proposed by Mr. Oliver Lang, and adopted in the "RAMILLIES." 1815.

312. Two plans for scuppers. (On a 1 in. scale.)
Proposed to be fitted to the lower decks of line-of-battle ships. 1815.

313. Two plans for scuppers; one showing a brass scupper, the other a short leaden scupper. 1832.

314. Plan for a gangway scupper, intended to be fitted to line-of-battle ships and frigates.

Proposed by Commander H. Downes, R.N. 1837.

315. Plan for a scupper, also a scuttle, intended for a rowing scuttle.

Proposed by Captain Bomgardt.

316. Pattern scupper with self-acting valve, to prevent the water washing on deck, as originally fitted to ships of the "ROYAL OAK" class. 1863.

317. Two plans (A and B) for scupper-valves, proposed from Devonport yard as improvements on the original plan referred to above for ships of the "ROYAL OAK" class. 1863.

318. Plan for a lead scupper, and a copper scupper box, showing the strainer.

Proposed by Mr. W. Ladd. 1863.

319. Pair of sluice valves (A and B) for H.M.S. "ACHILLES." 1863.

DIVISION K.

AFTER PARTS OF SHIPS, SHOWING THE ARRANGEMENTS NECESSARY IN CONNEXION WITH THE SCREW PROPELLER, AND TO ENABLE IT TO BE RAISED, &c.

340. After part of H.M.S. "RATTLER," showing the propeller and large aperture for receiving it, also the apparatus for raising the same. By the permission of the Lords of the Admiralty, this vessel was used by all inventors of propellers, orders being issued that their inventions were to be fitted into the same shaft, and propelled by power from the same engine, to prove the strength and efficiency of their propellers (on a $1\frac{1}{2}$ in. scale). 1844.

341. Stern, showing the propeller and plan for fixing the same; also the well for raising and lowering the propeller.

Proposed by Mr. Fincham, for blockships. 1845.

342. Rough stern, showing the propeller and the aperture in the dead wood, for securing the same. 1846.

343. MODEL (unfinished), showing a peculiarly made propeller with three fans, also the plan for securing the same. 1846.

344. Stern-post, dead-wood, keel and shaft, with the propeller secured to the foremost post. 1846.

345. Two sections (starboard side), showing the plan for the well and aperture to receive the propeller.

Proposed and adopted in H.M.S. "BLENHEIM." 1847.

346. Plan for fitting the propeller to the stern-post; also for fitting the rudder underneath the bottom of the vessel, instead of to the stern-post.

Proposed by Mr. W. Henwood, Master Shipwright, Malta Yard. 1850.

(See also Class VIII.)

347. Stern, showing the screw propeller, with the arrangement for raising or lowering the same. 1851.

348. Stern of a two-deck ship, showing the propeller, with a peculiar arrangement for fitting it, also the plan for raising and lowering the same. By Lord John Hay. 1851.

349. Two MODELS, showing the plan for forming the well and fitting the propeller. No. 1 shows the stern as suggested by the inventor, No. 2 as adopted in the Navy.

Proposed by Mr. Toddy Taylor. 1853.

350. Propeller and plan for fitting a cylinder to the bottom of the ship, as a protector or shield to the propeller.

Proposed by Commander Hore, R.N. 1856.

351. Plan for fitting shutters in the screw aperture, to 80 horse-power gun-boats.

Proposed by Mr. H. Chatfield. 1857.

352. Plan for fitting the propeller, with the apparatus for raising or lowering the same.

Proposed by Messrs. Murray and Miller, and fitted for trial in H.M.S. "SHARPSHOOTER." 1857.

353. Section of a ship (on a 1 in. scale for despatch gun-boats) showing the propeller, well, and the apparatus for lifting or lowering the propeller.

Proposed by Mr. Ord, Foreman of Fitters, Malta Yard. 1861.

354. Plan for fitting the screw propeller, also the framing for raising and lowering the same, as adopted in H.M.S. "DAUNTLESS." 1863.

355. Plan for fitting the stern to enable the screw-propeller to be raised; the screw shaft made with a joint from which point the after part of it works in a groove to admit of its being raised. 1863.

356. Section of the lower part of the ship, showing the aperture for the propeller and plan of the shaft passing through the dead wood and sternposts; also the plan for securing the dead wood and sternposts to the keelson by means of metal plates.

Proposed by Mr. J. Edye, Assistant Surveyor of the Navy, for H.M.S. "AGAMEMNON."

357. Starboard part of screw trunk of H.M.S. "WARRIOR," with apparatus for closing the aperture underneath, arranged on the outside of the trunk.

358. After part of the "ROYAL ALBERT," showing the propeller, well, and the shaft passing through the inner and outer sternposts.

This model is intended more particularly to show the plan adopted by Captain W. R. Mends, C.B., to arrest a dangerous leak in the ship (caused by the metal covering of the screw shaft breaking loose, tearing away the tubing in the sternpost, and forcing off the inner gland and stuffing box), on her passage from the Black Sea to Malta, in Dec. 1855, constructed by Mr. Sargent, Carpenter of the above ship, and the shipwrights of that ship, the "PRINCESS ROYAL," and the "SPHYNX," in five days, when the ship was hove off the shore on which she had been laid in the port of Nicolo, Island of Zea, and reached Malta on the 7th Jan. 1856.

The quantity of water made per minute (until the leak was stopped) averaged 5½ tons, and very nearly caused the ship to founder.

359. Section of stern (starboard side), showing the aperture and brass frame to receive the propeller, also a portion of the well for raising or lowering the same.

By Mr. J. Edye.

360. Section of stern (port side), showing the aperture and well for raising or lowering the propeller.

361. Plan for fitting the propeller, showing the propeller, well, and apparatus for raising or lowering the same.

362. Half stern (starboard side), showing half the propeller, and a proposed method of protecting it from danger by an iron framing.

363. Stern of a two-deck ship, showing the propeller, well, and plan for fitting it; also the plan for raising and lowering the same by means of a brass framing, and the assistance of the boom on poop deck.

By Mr. G. Turner, Devonport Yard.

364. Section of the lower part of a ship, showing the shaft passing through the dead-wood and stern-post.

(See also Class IV., Division E., Stern framing, &c.)

365. Plan for fitting the propeller in the original manner to the stern-post. The Model also shows a rudder under each counter (before the propeller) to steer the vessel.

366. Iron tank to be secured to the dead-wood and frame of screw ships and fitted with a sluice to be raised and lowered by a vertical screw, to prevent the free ingress of water into vessels in case of accidents in the stern-bearings.

Proposed by Mr. W. Ladd, Master Shipwright, and Mr. T. Hamshaw, Engineer, Malta Yard. 1857.

DIVISION L.

SHOT-PROOF CONNING HOUSES.

381. MODEL of the shot-proof conning or pilot house fitted in H.M.S. "ROYAL OAK." 1862.

382. MODEL of a conning house for armour-plated ships.

Proposed by Mr. R. P. Saunders, Assistant Master Shipwright, Keyham Yard. 1864.

DIVISION M.

GENERAL INTERNAL ARRANGEMENTS OF SHIPS.

401. Transverse section of a transport, showing the berths for the soldiers. 1852.

402. Midship section (on a $\frac{1}{4}$ -in. scale) of a transport, showing the horses in their stalls. 1852.

403. Arrangement of the after-hold, light-room, and spirit-room of H.M.S. "BOMBAY," burnt off Monte Video on the 14th December 1864.

CLASS VI.

Models of the various Articles and Appliances required for use on board Ship.

Divisions.

A.—Tanks.	N.—Patterns of logs, and deep-sea leads.
B.—Pumps.	O.—Pendulums, telegraphs for steering wheels and engine rooms, &c.
C.—Capstans.	P.—Time glasses.
D.—Windlasses.	Q.—Ships' compasses and binnacles.
E.—Screw jacks.	R.—Stoppers and shot plugs for iron and wooden ships.
F.—Anchors, anchor stocks, &c.	S.—Ships' lanterns for signalling, lighting, &c.
G.—Buoys for anchors.	T.—Galleys, condensers, and portable furniture, &c.
H.—Chains, chain cables, &c.	U.—Lightning conductors.
I.—Shackles for chain cables.	
K.—Compressors for chain cables.	
L.—Bits for chain cables.	
M.—Life buoys, life rafts, &c. (See Boats, Class II.)	

DIVISION A.

TANKS.

1. Water tank for first rate ships.

Proposed by Mr. Sadler.

2. Water tank, showing a drop hatch and chain attached. 1841.

3. Water tank. 1850.

4. Box (*a*), containing models, and a sketch (*d*), showing the tanks formerly in use in H.M. Navy, and the improvements introduced at the suggestion of Mr. Moore, carpenter, R.N., in 1857; also, two midship sections, (*b* & *c*), and a drawing (*e*), showing the plan for fitting the half and whole tanks on Mr. Moore's plan.

DIVISION B.

PUMPS.

20. Pump fixed to a pedestal.

21. Wells with pumps fitted to the same.

22. Pump worked by a semicircular and horizontal wheel.

23. Hand pump with leather hose attached.

24. Two buckets fitted with double valves.

25. Pump with four apertures, as intended to be fitted, showing a plan for extinguishing fire on board ship.

Proposed by Mr. Parsons. 1827.

26. Chain pump. 1828.

27. Chamber for a chain pump with a brass roller fitted to the same. 1828.

28. Plan for working six pumps by a horizontal rotary motion, supposed to be worked by hand, as the MODEL shows; the drumhead for fixing the bars similar to a capstan: attached is the plan of the pump boxes and trunk. 1831.

29. Hand pump. 1843.

30. Piece of deck, showing the metal cistern and hose for Massey's pumps, as fitted to the "KINGFISHER" and "FLYING FISH." 1845.

31. Plan for fitting pumps.

Proposed by Lieut. Brandreth, R.N. 1851.

32. Plan for working ships' pumps by means of the capstan. Fitted on board H.M.S. "IRRESISTIBLE" in 1864.

Proposed by Mr. M. Blanks, Engineer, R.N. 1864.

DIVISION C.

CAPSTANS.

50. Double capstan with iron spindle: may be used as a double or single capstan, by disposing of the iron fids which pass through the upper barrel and spindle.

Proposed by Sir Robert Seppings.

51. Single capstan; also the shape of the capstan bars.

Proposed by Commander H. Fleming, R.N.

52. Double capstan with iron spindle and drop palls.

53. Common double capstan with drop palls.

54. Single capstan with moveable whelps made to surge.

55. Plan of a Chinese capstan.

- 56.** Single capstan with iron spindle and drop-palls.

Proposed by Mr. W. Harding, Chatham Dockyard.

- 57.** Double capstan made to step on either the main or lower deck; palls to be fitted each side on the deck.

- 58.** Single capstan with wood spindle and iron plate in front of the whelps.

Proposed by Mr. Grills.

- 59.** Part of a capstan.

- 60.** Single capstan. Proposed by Capt. Phillips, R.N.

The MODEL also shows the objection made by Mr. Becon, of Chatham Yard, to the manner in which the pall-rim, top plate, and drop bolts wound the barrel and whelps.

- 61.** Single capstan. This plan is a suggestion by Mr. Becon, for improving Captain Phillips's single capstan.

- 62.** Double capstan with common or fourfold power. This capstan was objected to from the circumstance that when used with increased power the lower barrel has a motion contrary to the upper one.

Proposed by Captain Phillips, R.N.

- 63.** Double capstan, showing a plan for dispensing with the contrary motion of the barrels.

Proposed by Captain Phillips, R.N., and adopted in ships of the Royal Navy.

- 64.** French double capstan with wooden spindle, showing the palls on the deck.

- 65.** Double capstan with wood spindle, made to surge.

- 66.** Capstan.

Proposed by Mr. O. Hutchinson, New York.

- 67.** Small capstan with whelps tapering in the opposite direction to the ordinary capstan. Capstan bars in their places.

- 68.** Single capstan with cast-iron pall-heads for chain messengers. Proposed by Messrs. Gordon & Co., Deptford.

- 69.** Three pieces of deck and double capstan, showing the plan for securing the chain messenger.

Proposed by Sir Pulteney Malcolm.

- 70.** Series of capstans, disposed so as to obviate the necessity of surging. Proposed by Mr. W. Medlin, Engineer.

- 71.** Double capstan and spindle.

- 72.** Capstan head.

- 73.** Lower rim of capstan to take chain cable.

74. Double capstan.

Proposed by Mr. Echart, and adopted in H.M.S.
"DEFIANCE." Woolwich Yard. 1782.

75. Jeer capstan with an iron spindle, made to surge.

Proposed by Mr. Crispin, Carpenter of the
"ROYAL SOVEREIGN" yacht. 1802.

76. Single capstan with a moveable head and spindle; an increased power may be obtained by stepping the moveable head and spindle, formed at the side, in a wheel let into the partners: the spindle and capstan have a contrary motion.

Proposed by Mr. W. Kingston, Engineer, Portsmouth Yard. 1823.

77. Double capstan with iron spindles,—lower capstan with drop-pall.

Proposed by Mr. W. Harding, Capstan Maker, Chatham Yard. 1831. (Two MODELS).

78. Single capstan with iron spindle and pins dropping through the rim into an iron plate below for palling.

Proposed by Mr. Samuel Clark, Shipwright, Portsmouth Yard. 1834.

79. Body of a double capstan, with wood spindle, without the head or whelps. 1843.

80. Doublefold capstan, showing rims in place of whelps. 1847.

81. Capstan fitted in H.M.S. "ZEBRA." 1849.

82. Bow capstan and chain messenger.

By Mr. T. Brown.

83. Drumhead of a capstan, showing the plan for securing the bars. 1850.

84. Section of a drumhead, showing the plan for securing the capstan bars.

Proposed by Mr. W. Woodcock, Shipwright, Sheerness Yard. 1850.

85. Inner end of a capstan bar, to show two plans for securing the capstan bars.

Proposed by Mr. J. May, Single Stationed Man, Pembroke. 1851.

86. Section of the drumhead, showing the plan of a self-acting pin for securing each capstan bar.

Proposed by Mr. G. Turner, Master Shipwright, Woolwich Yard. 1851.

87. Drumhead of a capstan for first rates, illustrative of a proposition for strengthening the drum and trundle heads of capstans.

By the Master Shipwright of Sheerness Yard. 1852.

88. Part of a capstan, showing the plan of the drum-head and portion of the barrel.

Proposed by Mr. Lenox. 1852.

89. Part of a capstan, showing the plan of the drum-head and portion of the barrel.

Proposed by Mr. Harding. 1852.

90. Capstan; also showing runners with the main chain attached.

Proposed by Mr. P. Pocherty, Acting Carpenter in H.M.S. "ARETHUSA." 1854.

91. Allyn's patent American capstan, with brass head, showing the drumhead working the reverse to the body of the capstan. 1855.

92. Capstan and three runners for raking the main chain. 1855.

93. Drumhead of a capstan and one bar, showing a plan for applying a compressor to capstans; also, a plan for securing the capstan bars.

Proposed by Mr. J. Edwards, Foreman, Pembroke. 1855.

94. Section of the drumhead, showing a self-shifting capstan bar.

Proposed by Mr. J. Trickett, Assistant to the Chief Engineer, Woolwich Yard. 1857.

95. Two MODELS (A. & B.) (A.) Double capstan barrel without drumhead, showing the plan of the spindle (spindle attached), then in use. (B.) Double capstan barrel without drumhead, showing the plan of the spindle (spindle attached), proposed by Mr. H. Sangster, Capstan Maker, Woolwich Yard. 1858.

96. Drumhead for a capstan. 1859.

97. Two MODELS (A. & B.), of whelps for capstans; (A.) represents a defective whelp, as taken from the after upper deck capstan of H.M.S. "PRINCE CONSORT;" (B.), a proposed amended whelp of increased strength, and of the required shape for surging.

Proposed by the Officers of Pembroke Yard. 1862.

DIVISION D.

WINDLASSES.

120. Section of deck showing the plan of the windlass; also the method of leading and securing the messenger chain to the capstan.

121. Section of a bow, showing the plan for fixing the double windlass, also showing a brass shiver at each hawse hole for the chain cable.

Proposed by Mr. John Pindar. 1821.

122. Plan of windlass worked by thwartship lever, rendering a vertical motion which puts the windlass in action. 1845.

123. Plan of a windlass used for mining operations. 1855.

124. Unfinished MODEL of a windlass.

DIVISION E.

SCREW JACKS.

140. Plan of the jack-in-the-box fitted with friction rollers, used for raising decks, &c.

Proposed by Mr. Kendall. 1801.

141. Plan of a lifting-jack, used for packing bales and launching purposes.

By Messrs. Edward Gibson & Son, shipbuilders, Hull. 1845.

DIVISION F.

ANCHORS, ANCHOR STOCKS, &c.

150. Common anchor and stock, the corners of the flukes taken off to prevent fouling.

151. Anchor.

Proposed by Mr. Hookey, Master Boat Builder, Woolwich Yard.

152. Part of an anchor, showing a hollow shank and ribs to strengthen the palms.

153. Anchor, showing hollow shanks, and cable passing through the centre, and ribs to strengthen the palms.

Proposed by Mr. W. Kingston, Engineer, Portsmouth Yard.

154. Anchor, showing the method of welding the flukes on the shank.

155. Two common anchors.

156. Metal anchor, showing the triangular shank and double fluke.

Proposed by Mr. Christopher.

157. Wood and iron models, showing the plan of putting together the anchors proposed by Mr. Perrin.

158. Mode of putting anchors together, showing the shank, palm, and flukes.

159. Iron and wood models, showing the method of putting shanks and palms of anchors together.

160. Method of uniting the palm with the shank of the anchor.

161. Plan for making anchor stocks with a scarp from the centre.

162. Two proposed plans for repairing anchor stocks. Woolwich Dockyard.

163. Stock of an anchor made from four pieces of timber, showing the method of converting timber for anchor stocks.

164. Two iron stocks for anchors.

165. Anchor stock on the usual plan.

166. Three common anchors, showing the round shanks.

167. Portable anchor, with flukes secured to the shank by pin.

168. Anchor stock fastened with hooks and eyes, slipping on.

Proposed by Commissioner Hope, R.N.

169. Grapnel in the shape of an anchor.

170. Mooring block.

Proposed by Mr. J. Park, Master Attendant, Portsmouth Yard. 1815.

171. Mooring block, or substitute for mooring anchors, showing the round shank and wooden stock.

Proposed by Mr. Hemmans, Master Attendant, Chatham Yard.

172. Mooring block with chain attached.

- 173.** Mooring block, proposed for foul ground.
- 174.** Two small anchors with chain attached; and one large anchor used for mooring purposes, in use in 1812.
- 175.** Anchor of which the palms are made to swivel in the shank, by displacing a square hoop on the shank by two chains,—the chains passing through the stock.
Proposed by Mr. Grant, Portsmouth. 1812.
- 176.** Anchor and stock; also makeshift anchor.
Proposed by Lieut. W. Rodger, R.N. 1819.
- 177.** Two anchors on a stand, one showing the Admiralty plan as per table, the other a proposition of Lieut. Rodger's.
- 178.** Anchor showing a proposition to strengthen the arms by means of links at the side; the links to be the same size as the chain cable. 1820.
- 179.** Anchors on various plans.
Proposed by Mr. Spencer, Chatham Yard.
1820 and 1822.
- 180.** Part of the anchor proposed by Mr. Brown, Master Attendant of Woolwich Yard. 1822.
- 181.** Patent anchor (in duplicate).
Proposed by Mr. Hawkins. 1822.
- 182.** Two brass anchors with metal frame, the stocks passing through the shank at right angles close to the palms. 1829.
- 183.** Anchor with metal frame, the stock passing through the shank at right angles close to the palms.
N.B.—The shank can be reduced in weight by being hollowed out. 1829.
- 184.** Metal anchor with wooden stocks. This anchor has additional thickness at the side of the palms. 1829.
- 185.** Two anchors. Proposed by Mr. Perrin. 1829.
- 186.** Double anchor. Proposed by Mr. Hawkins. 1829.
- 187.** Several pieces of iron, showing the process of making anchors from the bar iron. 1829.
- 188.** Several pieces of iron, showing the process of making anchors.
By Mr. Tucker. 1829.
- 189.** Anchor suspended to the cat-head. 1830.
- 190.** Two patent anchors, one iron, the other brass.
Proposed by Mr. Porter. 1841.

191. Two anchors with brass-wire shanks and lead palms. 1843.

192. Temporary anchor made from broken bower (stream and kedge anchors).

Proposed by Mr. Jonathan Aylen, Master of H.M.S. "VICTORY." 1843.

193. Anchor with the shank in two pieces, secured by hoops. Made from iron, relic of the "ROYAL GEORGE." 1846.

194. Anchor made to swivel on the shank.

By Mr. Miller, Plymouth Yard. 1846.

195. Iron stock for anchors. 1849.

196. Anchor. Proposed by Captain Inglefield, R.N. 1851.

197. Brass anchor, showing a spiral spring on the shank.

By Mr. Thomas Meriton. 1852.

198. Six experimental anchors.

Anchor Committee, Sheerness. 1852.

199. Three small anchors, and part of the fluke or palm; one side showing the plan proposed by Mr. Blake, the other Lieutenant Rodger's. 1853.

200. Two portable anchors, one iron, the other wood. 1857.

201. Plan for clearing a foul anchor (with chain attached). Proposed by Mr. Curry, Master, R.N. 1858.

202. Anchor with iron stock and slip-hook for chain cable. By Mr. James Briscoe, Sheerness Dockyard. 1863.

DIVISION G.

BUOYS FOR ANCHORS.

230. Common buoy (zinc).

231. Common buoy (wood).

DIVISION H.

CHAINS, CHAIN CABLES, SLIP HOOKS, &c.

250. Piece of chain, showing two of the earliest methods of making chain cables.

251. Two short pieces of chain for shank-painters.

252. Double shackle chain, as fitted to topsail sheet at Portsmouth Yard. 1850.

253. Two chain cables with shackles.

254. Calliper hooks and chain, as fitted to foretopsail sheets. 1850.

255. Three cable links, $2\frac{5}{8}$ in. in diameter, made for the "GREAT EASTERN," and one sample link for the same ship, prepared for welding on the side.

Messrs. Henry Wood and Co., Liverpool.

256. Two small sample links on the old plan.

257. Broken link of chain cable from H.M.S. "VERNON." 1841.

258. Specimens of the various kinds of chain at present (1864) in use in H.M. service.

- (a.) Chain, short-linked, $\frac{1}{8}$ of an inch, to attach pins to capstans, forelocks to anchors, pendants to ports, scuttles, ash shoots, &c.
- (b.) Chain, short-linked, $\frac{3}{16}$ of an inch, to attach pins to capstans, forelocks to anchors, pendants to ports, scuttles, ash shoots, &c.
- (c.) Chain, short-linked, $\frac{1}{4}$ of an inch, to attach pins to capstans, forelocks to anchors, pendants to ports, scuttles, ash shoots, &c.
- (d.) Chain, short-linked, $\frac{5}{16}$ of an inch, to attach pendants to ports, guys for martingale chains to tillers, and falls for blocks.
- (e.) Chain, short linked, $\frac{3}{8}$ of an inch, used for davit guys, gammoning chain, and chain for topsail sheets, &c.
- (f.) Chain, short-linked, $\frac{7}{16}$ of an inch, used for davit guys, gammoning chain, stays for funnels, &c.
- (g.) Chain, short-linked, $\frac{1}{2}$ of an inch, used for boats' slings, truss pendants, stays for funnels, &c.
- (h.) Chain, short-linked, $\frac{9}{16}$ of an inch, used for boats' sling, top lifts, necklaces, &c.

- (j.) Chain, short-linked, $\frac{3}{8}$ of an inch, used for boat slings, davit topping lifts, fair leads, &c.
 - (k.) Chain, short-linked, $\frac{1}{2}$ of an inch, used for mast-head slings, topping lifts, truss pendants, &c.
 - (l.) Chain, short-linked, $\frac{3}{4}$ of an inch, used for truss pendants, slings for yards, &c.
 - (m.) Chain, short-linked, $\frac{7}{8}$ of an inch, used for slings for yards, truss pendants, &c.
 - (n.) Chain, short-linked, $\frac{1}{2}$ of an inch, used for stoppers for bower anchors, shank painters, &c.
 - (o.) Chain, short-linked, $\frac{1}{2}$ of an inch, used for stoppers for bower anchors, shank painters, &c.
 - (p.) Chain, short-linked, 1 inch, used for stoppers for bower anchors, shank painters, &c.
 - (q.) Chain, short-linked, $1\frac{1}{4}$ inches, used for slings for yards, crane chain, &c.
 - (r.) Chain, short-linked, $1\frac{1}{4}$ inch, used for slings for yards, crane chain, &c.
 - (s.) Chain cable, 1 inch, used for stream cables, boats' moorings, mast-head slings, &c.
 - (t.) A link of small mooring chain, used for mooring ships in harbour.
- 259.** Two slip hooks for chain cables.
- 260.** Three nippers for chain cables.
- 261.** Piece of atlas round iron for making cables, &c.
From the Atlas Steel and Iron Works, Sheffield. 1864.

DIVISION I.

SHACKLES FOR CHAIN CABLES.

- 280.** Eight full wood pattern shackles for two and three decked ships. By Admiral the Hon. G. Elliot, R.N.
- 281.** Full wood pattern shackle, with link and thimble intended for rope or iron cable.
- 282.** Wood pattern shackle. 1851.
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DIVISION K.

COMPRESSORS FOR CHAIN CABLES.

300. Two compressors.

By Mr. Peake.

301. Three compressors; *a.* Original; *b.* As proposed by the Surveyor of the Navy, Sir William Symonds; *c.* As proposed by the Plymouth-yard Officers. 1835.

302. Compressor.

303. Compressor for 36-gun frigate.

By Mr. Richard Bonniwell, Shipwright, Chatham Yard. 1831.

304. Grappler, or compressor.

By Mr. Maudslay. 1845.

305. Compressor, with short piece of chain. 1854.

DIVISION L.

BITTS FOR CHAIN CABLES.

320. Bitts secured together by a plate.

By Mr. John Edye, Assistant Surveyor of the Navy.

321. Two riding bitts without cross pieces for a first-rate ship, fitted with cast-iron rim, supporters, and rollers.

By Captain the Hon. G. Elliot, R.N. 1829.

322. Cross-piece and bitts, showing an iron supporter. 1844.

323. Deck bitts and cross-piece with iron knee supporters. 1844.

324. Two MODELS (A. & B.), of the small swivel bitts, fitted on each side of the forecastle, in H.M.S. "PRINCE REGENT," which were afterwards removed, not being found to answer, and the fixed bitts substituted. 1852.

325. MODEL of the lining for bitts used by the Russians in their ships to prevent chafing.

By Commander John Seccombe, R.N. 1856.

326. Method of making riding bitts in pieces, when timber of sufficient size cannot be obtained.

Proposed by Mr. Oliver Lang, Chatham Yard. 1859.

DIVISION M.

LIFE BUOYS, LIFE RAFTS, &c.

(See CLASS II.—DIVISION D.)

DIVISION N.

PATTERNS OF LOGS AND DEEP SEA LEADS, &c.

340. Wood pattern log in the shape of a fish; very early period.

341. Two of Massey's patent logs to show the speed of a ship.

342. Brass tubular log with spiral spring.

By Mr. Francis Higginson. 1828.

343. Bow, showing a plan for indicating when a vessel is in shoal water.

By Mr. James Edwards, Foreman, Pembroke Dockyard. 1852.

344. Vessel fitted inside with a longitudinal brass tube open at its centre to the sea, and having at each end a vertical glass tube; supposed to be intended to measure the extent of a vessel's pitching.

Received from Lient. John Seccombe, R.N.

345. Vessel fitted with the "Navigable Depth Indicator," as proposed by Mr. W. Rogers. (See CLASS I.—DIVISION B, No. 393.)

DIVISION O.

PENDULUMS, TELEGRAPHS FOR STEERING
WHEELS AND ENGINE ROOMS, &c.

360. Pendulum, for showing the greatest inclination of a ship, for gunnery purposes.

By Mr. Henry Soper.

361. Dial for engine-room, showing the full, half, and slow speed.

362. Pendulum showing the inclination of the ship.

363. Small pendulum.

364. Patent anti-collision dial, with diagram, working rule, parallel, and points. By Captain Perry.

365. Berthon's patent clinometer.

366. Pendulum in brass circular case with index to show the greatest inclination of a ship in the night.

By Mr. A. G. Edye, Mate, R.N. 1836.

367. Transverse section of H.M.S. "BRITANNIA," drawn on a board, showing the inclination of the vessel on her passage from Malta to England, with remarks.

By Mr. W. Kennish, Carpenter, R.N. 1843.

368. Alarum for communicating with engine room. 1846.

369. Index for steering wheels ordered to be fitted to all steering wheels in 1850.

Proposed by Mr. Walker, Foreman, Portsmouth. 1849.

370. Pendulum.

Proposed by Mr. E. Emanuel, Portsea. 1851.

371. One of the indicators for Mr. Gisborne's steering signals. 1863.

DIVISION P.

TIME GLASSES.

390. Jennings's patent time-glasses, to run 14 and 28 seconds. 1831.

391. Common sand-glass, to run 14 seconds.

DIVISION Q.

SHIPS' COMPASSES AND BINNACLES.

400. Pope's patent dipping needle compass, with perforated card. (*An obsolete compass.*)

401. Oscillating ship's compass. (*An obsolete compass.*)

402. Crow's patent liquid compass, patented in 1813. The first liquid compass in use.

403. Common ship's compass, obsolete.

By Messrs W. and T. Gilbert.

404. Compass in revolving metal barrel, with pendulum, obsolete.

405. Two MODELS (A. & B.) of standard compasses ; (A.), the standard compass with four small solid pillars as in use at present (1863) in Her Majesty's Navy ; (B), one with one large hollow pillar, as proposed by Mr. Matthew May, Leading Man of Joiners, Devonport Dockyard, and fitted experimentally in H.M.S. "PRINCE CONSORT" in 1863.

406. Two binnacles (on a 3-in. scale).

Proposed by Mr. David Harvey, Chief Modeller,
Somerset House. 1853.

407. Two binnacles, one containing a compass frame.

By Mr. Walker, Foreman of Joiners, Portsmouth
Dockyard.

DIVISION R.

STOPPERS AND SHOT PLUGS FOR IRON AND WOODEN SHIPS.

420. Small stopper for shot-holes.

421. Plan for stopping shot-holes in iron funnels of steam vessels.

422. Pattern stopper for shot-holes, lined with felt, with worsted balls, lanyard, and cleat.

By Mr. Oliver Lang. 1846.

423. Full-pattern stopper for shot-holes, with iron cross-bar, nut and screw. 1846.

424. Pattern stopper for shot-holes. 1846.

425. Pattern stopper for shot-holes, stuffed with felt, with lanyard. 1846.

426. Stopper for shot-holes in iron ships.

By Capt. Gardiner. 1859.

427. Plan for stopping shot-holes.

By Mr. C. Webster. 1863.

428. Plan for stopping shot-holes.

By Admiral the Hon. G. Elliot, R.N. 1863.

429. Pattern iron shot-plug for steamers' funnels or iron vessels.
By Capt. Chambers.

430. Shot-plug. 1838.

431. Pattern shot-plug, india-rubber and wood, with rope lanyard. 1846.

432. Shot-plug.

By Mr. James Briscoe, Sheerness Yard. 1863.

433. Plan for a shot-plug.

Proposed by Mr. S. E. Surcombe. 1864.

434. Two MODELS (A. & B.), showing two plans for constructing bolts in sections for stopping shot or rivet holes, so made that the pieces forming the head may be passed through the hole one after the other, and then being placed together may be screwed up tight.

Proposed by Mr. R. Elder. 1864.

DIVISION S.

SHIPS' LANTERNS FOR SIGNALLING, FIGHTING, &c.

450. Four signal lanterns.

By M. Bordier Marçet, Paris. 1820.

451. Signal lantern.

By Mr. Thomas Allen. In use in 1825.

452. Two signal lanterns.

Purchased of Mr. W. Austin, Woolwich. 1827.

453. Hay's fighting lantern. 1830.

454. Two signal lanterns. 1841.

455. Two signal lanterns. 1841.

456. Patent signal lantern.

By Mr. J. Burnell, London. 1844.

457. Signal lantern. 1851.

458. Lamp and burners.

By Mr. M. Thompson. Registered 1852.

459. Lamp showing a red and green light for vessels beating to windward, or before the wind.

By Mr. J. Scraggs. 1833.

DIVISION T.

GALLEYS, CONDENSERS, AND PORTABLE FURNITURE, &c.

481. MODEL (on about a $1\frac{1}{2}$ in. scale) of a "ship's galley" or "cooking apparatus," as used in H.M. Navy about the year 1830.

482. Part of the cooking apparatus of the Royal Yacht the first "VICTORIA AND ALBERT."

By Messrs. Brown and Redpath.

483. Ship's iron galley as commonly in use.

484. Portable stove for use between decks.

485. MODEL of a firehearth fitted with cylinder for roasting coffee, from H.M.S. "GRAMPUS," 1846.

486. MODEL of a gangway ladder, with rule joint, by which it may be hauled up under the deck without being unshipped.

By Sir John Pechell.

487. Portable camp bedstead. 1857.

488. Pattern for a zinc case and small canvas bayre-sack, proposed to be supplied to all seamen in lieu of the black bag they formerly had.

By Captains Harris, Farquhar, and Wilson. 1859.

489. A set of MODELS, seven in number (A, B, C, D, E, F, & G), showing a plan for seamen's mess tables and stools, arranged so that when clearing the quarters they can readily be put up overhead between the guns on strong battens, with a ledge to prevent their rolling off.

(A.), the ship's side; (B.), the table, one end with a leg made to fold up, the other end to fit on to the ship's side; (C. & D.), two stools with legs fitted on two plans somewhat similar to the table; (E. & F.), two stools, one end to be supported by a fire-bucket instead of the legs shown in the preceding model; (G.), the bucket to support the end of the stool, to hold the water for the men, and, if required, to serve as a fire-bucket.

Proposed as an expeditious plan for clearing the
quarters of seamen's tables and stools, by
Captain C. Hall, R.N. 1855.

490. Plan for seamen's hammocks, fitted so as to be lashed up in the shortest possible time for stowing in the nettings and speedily clearing the quarters. No hitches required in the lashings or halyards.

Proposed by Capt. C. Hall, R.N. 1855.

491. MODEL of a common mess table for seamen, with the slings for suspending it to the beams, as commonly used in H.M.'s ships at the present time (1865).

492. Pattern iron leg for the stool of a seaman's mess table, as generally used in H.M.'s ships at the present time (1865).

DIVISION U.

LIGHTNING CONDUCTORS.

500. Lower part of mast fitted with lightning conductor.
By Sir W. Snow Harris. 1851.

501. Lower mast and topmast fitted with lightning conductors.
By Sir W. Snow Harris.

502. Part of a topmast, with funnel for rigging and lightning conductor.

503. Topmast with lightning conductor.
By Sir W. Snow Harris.

504. Skeleton frame of a ship, showing lightning conductors on the masts, through step and keelson, and on the side under the wales.

CLASS VII.

Models of the various Articles in connexion with the
Armament of Ships.*Divisions.*

- | | |
|--|---|
| A.—Carronades, with the carriages, slides, tackle, &c. | E.—Shields, and plans for working guns in them. |
| B.—Broadside guns, with the carriages, slides, tackle, &c. | F.—Plans for loading guns, cleaning and transporting them, &c. |
| C.—Pivot guns, with the carriages, slides, tackle, &c.; also the arrangements in connexion with the bulwarks to enable guns to be fired clear of them. | G.—Rifles, bayonets, and other small arms, and the fittings for them. |
| D.—Mortars or bombs, with the beds, carriages, &c. | H.—Shot, shell, rockets, tubes, fuzes, torpedoes, &c., and the fittings for them. |
| | I.—Plans for heating shot and carrying the same. |

DIVISION A.

CARRONADES, WITH THE CARRIAGES, SLIDES,
TACKLE, &c.

1. Plan for fitting carronades on the inside principle.
By Sir William Congreve. About 1800.
2. Carronade fitted on the common principle inside, on the main deck. 1800.
3. 32-pounder carronade, fitted on the inside principle, with the slide shortened. 1814.
4. 32-pounder carronade, fitted on the inside principle, with slide shortened for quarter deck.
5. Carronade, on the inside principle, as fitted to H.M.S. "LIBERTY," 16 guns.
6. Two carronades, showing the inside and outside principle.
7. Carronade (32-pounder), fitted on the outside principle.
By Mr. Ward. 1830.
8. Carronade on the non-recoil principle. Deptford Yard.
9. Carronade, fitted on the non-recoil principle.
By Sir Henry Peake, Deptford Yard. 1803.

10. Two carronades, on the non-recoil principle. 1820.
11. Carronade (32-pounder), on the non-recoil principle, outer end of the bed and slide shortened $3\frac{1}{2}$ inches to prevent the deck being encumbered. By Mr. Ward.
12. Port, with fittings for a carronade on the non-recoil principle.
13. Carronade and slide, with trucks under the carriage at opposite angles, about 25° from the thwartship line. 1828.
14. Carronade, fitted to swivel on the lower port-sill. By Mr. J. Peake, Assistant Master Shipwright, Woolwich Yard. 1820.
15. Three plans for fitting carronades and ports, one as fitted to the "SCYLLA," at Portsmouth Yard, in 1830. By Captain the Hon. G. Elliot, R.N. 1829.
16. Carronade, fitted with cog wheels on the under side of the carriage, working into cogs on the deck, being a plan for training.
17. Carriage for carronade, with four iron rollers underneath.
18. Carronade and slide (32-pounder), with brass trucks.
19. Port, carronade, and slide.
20. Two pivot plates for carronade slide. By Captain Murray.

DIVISION B.

BROADSIDE GUNS, WITH THE CARRIAGES, SLIDES, TACKLE, &c.

40. Two guns, one on Commander Marshall's plan, the other on the common principle. 1827.
41. Top side, gun, and carriage.
42. Mode of mounting long guns. By Commander James Marshall, R.N. 1827.
43. Long gun and carriage with iron swivel trucks, the brackets or sides of the carriage made from a portion of King Henry V.'s cradle. Carriage invented by Commander R. H. Fleming, R.N. 1830.

- 44.** Topside fitted for gun on the inside principle.
- 45.** Gun and two carriages. By Sir Thomas Hardy.
- 46.** Two guns (32-pounders) and carriages.
- 47.** 18-pounder gun and carriage.
- 48.** Gun carriage, with foremost trucks made to travel under the brackets.
- 49.** Mode of fitting a 32-pounder gun of 25 cwt. in the "IMOGEN." Portsmouth Yard. 1831.
- 50.** Gun carriage, as fitted in H.M.S. "SAPPHIRE," at Portsmouth Yard.
By Mr. J. Nolloth, Master Shipwright. 1831.
- 51.** 24-pounder gun and carriage, with iron trucks, called the "Reform." By Mr. W. A. Blair Adam. 1831.
- 52.** Gun and carriage.
- 53.** Gun and carriage.
- 54.** Gun, carriage, and slide.
- 55.** Two guns on the common principle. 1836.
- 56.** One gun on carriage, and two on slides, on the inside principle.
By Mr. J. Edye. 1837.
- 57.** Gun and carriage, on the inside principle, showing a plan for elevating and depressing the gun by means of a winch under the bed. By Capt. the Hon. G. Elliot, R.N.
- 58.** Gun carriage, bed, and quoin, with two iron trucks under the carriage.
- 59.** Gun fitted, on the inside principle, to H.M.S. "RAPID."
- 60.** Gun and carriage, with one pair of trucks, as fitted to the "DAPHNE," 18 guns.
- 61.** Two guns (32-pounders) and two carriages, one with three trucks in front of carriage, as proposed.
- 62.** Gun, as proposed to be mounted and fitted in steam and flush deck vessels.
By Mr. Fearnell, shipbuilder, Limehouse.
- 63.** Two guns, mounted on the inside principle, and part of a stern. The shots from these guns will intersect each other at a distance of 200 yards from the ship.
- 64.** Series of five guns; four 32-prs. with carriages, and one single gun (68-pr.).

65. Gun and carriage, showing a plan for elevating and depressing the gun by a sliding bed underneath.

66. Gun with carriage, fitted with lever, to raise and lower the bed and quoin.

67. Carriage with lever, showing a plan for raising and lowering bed and quoin.

68. Gun fitted on a plan for elevating and depressing.

By Capt. J. N. Taylor, R.N.

69. Pattern train tackle bolt.

70. Port fitted for a gun with breeching.

71. Shackle and thimble for gun.

72. Three wood pattern shackles for gun-breeching.

73. Wood pattern shackle for gun-breeching.

74. Pattern shackle for gun-breeching.

75. Two wood pattern eye-bolts, to pass through the ship's side, for shackles to guns.

By Mr. R. Blake, Master Shipwright, Portsmouth Yard. 1852.

76. Iron base ring and lock of a gun.

77. Two pattern gun locks.

78. Base ring lock and hammer for gun, with short piece of brass gun let in.

79. Two models of detonating waterproof lock and apron.

By Capt. Taylor, R.N., C.B.

80. Two patterns, one of lock and pan on the old plan, the other of percussion.

81. Wood pattern lock and hammer for gun in general use in the Royal Navy at the present time, 1864, with percussion tubes.

82. Gauge for showing the depression and elevation of a gun. 1846.

83. Gun without carriage, fitted with continuation of sight. 1843.

84. 32-pr. gun and carriage; proposed continuation of sight cast on the gun.

By Mr. W. Burney, gunner, H.M.S. "BRITANNIA."

85. Model of the sights used on board Russian ships.

By Commander John Seecombe, R.N. 1857.

86. Model of a skeleton gun, such as is used for fitting the ports, &c.

87. Part of a port fitted with two palls to keep the gun in the centre.

88. Muzzle of a gun with tompon and pin.

89. Four of Hancock's patent brass castors, proposed to supersede trucks under guns, with cast-iron sockets.

90. Two gun carriages (one with the gun on it), showing a plan for the foremost trucks to travel under the brackets.

Proposed by Colonel Colquhoun, Woolwich Arsenal.
1850.

DIVISION C.

PIVOT GUNS, WITH THE CARRIAGES, SLIDES, TACKLE, &c.; ALSO THE ARRANGEMENTS IN CONNEXION WITH THE BULWARKS TO ENABLE GUNS TO BE FIRED CLEAR OF THEM.

110. Pivot gun for steam frigates, on after part of deck.

111. After part of the quarter-deck of the "VINDICTIVE," with pivot gun, showing a proposal of Mr. Blake's for fitting her with a 10-in. gun. 1841.

112. Pattern of pivot, bolt, and socket for gun on the old plan.

113. Pattern of pivot, bolt, and socket for gun on the new plan.

114. Patterns of pivots and folding joints for guns fitted to H.M.S. "FURY," "ODIN," and "EXCELLENT."

115. Bow, with pivot gun fitted.

By Mr. Fincham, Master Shipwright, Portsmouth Dockyard. 1850.

116. Stern, with pivot gun fitted.

By Mr. Fincham. 1850.

117. Pivot, gun, carriage, and slide, showing the proposed method of lowering the axis to a distance of three feet from the deck.

By Lieut. Roberts, R.N. 1850.

118. Pivot gun working on the centre of the deck, as fitted to H.M.S. "LYNX," at Portsmouth.

By Lieut. Huntley.

119. Section of deck with pivot gun as fitted in H.M.S. "GRIFFON."

120. Mode of pivoting guns.

By Mr. Martin, Sheerness. 1864.

121. Plan for lowering bulwarks of steam vessels for pivot guns.

By Mr. R. Blake. 1841.

122. Two models of the "GORGON's" top-side, showing plan for lowering bulwarks.

123. Plan for lowering bulwarks.

Proposed by Mr. Hawkes.

124. Plan for lowering bulwarks of steam vessels.

By Mr. Oliver Lang.

125. MODEL of a skeleton gun and slide, such as is used to mark the deck and side for the necessary fittings at the present time.

DIVISION D.

MORTARS OR BOMBS, WITH THE BEDS, CARRIAGES, &c.

150. Section of mortar, showing the method of fitting the bomb-bed. 1808.

151. Section of mortar vessel, bomb and bed, with diagonal pieces fitted under deck to support the same.

152. Midship section with bomb bed and mortar.

153. Mortar swivelling on bed in frame.

By Captain Roberts, R.M.A. 1855.

154. Wrought-iron mortar swivelling on bed.

By Mr. James Nasmyth.

155. Mortar bed.

156. Mortar for throwing a rope to a vessel on shore.

By Captain Manby, F.R.S. 1853.

DIVISION E.

SHIELDS AND THE PLANS FOR WORKING THE GUNS IN THEM.

170. Two midship sections of ships with shot-proof revolving shields and three small brass guns.

By Mr. W. Bush. 1862.

171. Position and form of the deck of the "ROYAL SOVEREIGN," showing the shields (on a $\frac{1}{4}$ -in. scale.) 1862.

172. Mode of supporting the shields in the "ROYAL SOVEREIGN," (on a $\frac{1}{4}$ -in. scale.) 1864.

DIVISION F.

PLANS FOR LOADING GUNS, CLEANING AND TRANSPORTING THEM, &c.

200. Gun on sledge, showing a plan for transporting cannon.

201. Revolving barrel, with gun inside, showing a plan for transporting guns up a precipice.

202. Two guns and a slide, showing a plan for loading at the breech.

203. Metal gun, showing a plan for loading at the breech.

204. MODELS of Captain Cavallo's and Baron Wahren-dorff's breech-loading guns.

By Commander Hewlett, R.N.

205. Plan for spunging out guns or funnels.

DIVISION G.

RIFLES, BAYONETS, AND OTHER SMALL ARMS, AND THE FITTINGS FOR THEM.

220. Musket, with percussion lock and bayonet, showing a plan for securing the bayonet to prevent its being drawn off.

221. Plan for ramming home and discharging 14 gun-barrels at one time. 1850.

222. Gutta-percha pouch for powder. 1855.

DIVISION H.

SHOT, SHELLS, ROCKETS, TUBES, FUZES, TORPEDOES, &c., AND THE FITTINGS FOR THEM.

240. Lead MODEL of solid shot, $3\frac{1}{2}$ in. in diameter. Before 1838.

241. Four and half inch hollow shot. About 1838.

242. Two shot formed of several pieces, (also one piece separate to show the proposed mode of construction), so that after being discharged from the gun, the several pieces forming the shot may separate and spread like a shell.

By Mr. Mott, New York. 1852.

243. Pattern hollow shot. 1852.

244. Wood pattern shot, with six springs. 1857.

245. Two pattern plans for tapered shot. 1857.

246. Harpoon shot with chain, &c., to be thrown from a gun in case of shipwreck, to enable the crew to get on shore.

By Mr. Spencer. 1827.

247. MODEL of shell with three wood tubes for fuzes.

By Mr. Spencer. 1825.

248. Four MODELS of shells fitted with metal tube for fuze :—

A = ten-inch.

B = eight-inch.

C = six-inch.

D = four-inch. 1838.

249. Pattern tapered shell, with four wings and percussion. 1850.

250. Lead MODEL of a shell, with metal tube for fuze.

251. Long pattern shell, with percussion cap. 1851.

252. Pattern (supposed) grenade, with four wings. 1858.

253. MODEL of 32-pounder shell rocket.

254. Two MODELS, showing a proposal for an explosive machine, to be surrounded with musket-balls.

- 255.** MODEL of eight-pounder rocket.
- 256.** Three wooden tubes for fuzes.
- 257.** MODEL of metal fuze, to do away with the cap screw. By Commander Clark, H.M.S. "EDINBURGH." 1850.
- 258.** Lock of a torpedo. An American plan for destroying the "HOGUE." About 1814.
- 259.** Submarine exploder.
- 260.** Machine for destroying an enemy's ship.
By Mr. James Byrne. 1863.
- 261.** Part of a coaming, showing a plan for fitting a shot rack.
By Mr. R. Blake. 1840.
- 262.** Part of a shot rack. By Mr. R. Blake.
- 263.** Pattern rack for gun cartridges. 1859.
- 264.** Pattern leather safety-pouch for fuzes.
- 265.** Pattern of a proposed gutta-percha cartridge-case.
- 266.** Cartridge box. 1844.
- 267.** Powder boxes. 1855.
- 268.** Two pieces (A, B) of shot. A, spherical; B, long shot. Made of Atlas toughened cast steel, slotted and broken to show the density and tough nature of the steel.
From the Atlas Steel and Iron Works, Sheffield. 1864.
- 269.** Turning from a long shot in one length of 105 ft.
From the Atlas Steel and Iron Works, Sheffield. 1864.
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DIVISION I.

PLANS FOR HEATING SHOT AND CARRYING THE SAME.

- 280.** Pattern iron can for carrying red-hot shot. 1853.
- 281.** Two pattern iron cans for carrying red-hot shot.
1857.
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CLASS VIII.

Models of Steering Apparatus, permanent or temporary,
with Stern Posts, Braces, and Pintles.

Divisions.

- | | |
|---|---|
| A.—Plans for permanent rudders, or permanent substitutes for rudders. | C.—Plans for securing the rudder to the ship. |
| B.—Plans for temporary or spare rudders. | D.—Plans for working and paulling the rudder. |
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DIVISION A.

PLANS FOR PERMANENT RUDDERS, OR PERMANENT SUBSTITUTES FOR RUDDERS.

1. Two rudders (A and B). (A) shows the bearding of the rudder as formerly fitted; (B) shows an alteration in the bearding by which the rudder head is less wounded, and which was ordered to be generally adopted in 1801.

2. Plan for a rudder to be made in two parts, the upper part to be hollow, so that the lower part may slide up into it in the event of the ship's grounding.

3. Round-headed rudder, head much wounded. 1809.

4. Two short heads of rudders, square, with plan for steering above the head. 1812.

5. Thompson's patent square-headed rudder and stern post, the after part of rudder tapered to a sharp edge.

6. MODEL of a lee-board in shape of rudder.

7. Round-headed rudder, showing the number of pieces it is made of, with two pintles.

8. Round-headed rudder of the American sloop "PEACOCK."

Copied from Capt. Sherriiff's. Sent from Woolwich Yard. 1828.

9. Rudder, and drawings of the same.

By Mr. George Stockwell, Shipwright, Rotherhithe. 1830.

10. Square-headed rudder, showing a method by which the four after-pieces of the rudder will slide up in the event of the ship striking the ground.

By Capt. J. M. Taylor, R.N.

11. Two MODELS (A and B) showing a plan for steering a ship. (A) shows the after part of a ship fitted with the apparatus on each side in such a manner that either of them may be extended or withdrawn at pleasure, according to the direction in which it is desired to turn the ship; (B) the apparatus itself, and the mode of working it.

Proposed by Mr. Cork, Pembroke Yard. 1831.

12. Stern, with screw propeller and rudder or ear on each side of stern-post, being a mode of applying screw propeller. Patented by Mr. Joseph Maudslay. 1843. (Two Models.)

13. Rudder head and stern-post, showing a plan for fixing the tiller by means of an iron strap round the rudder head.

14. Square-headed rudder, showing a method of putting the same together. 1847.

15. Suggestion for improving rudders (on a $\frac{1}{2}$ -inch scale).

Proposed by Mr. John William Hall, Master R.N. 1849.

16. Two MODELS (A and B) showing a plan for improving the construction of ships' rudders, so as to render the rudder head more capable of resisting sudden or successive shocks of the sea.

Proposed by Mr. W. Ladd, Master Shipwright, Malta, and adopted in the "ALGIERS" and other ships. 1855.

17. Three MODELS (A, B, and C) showing an improvement in fitting the rudder heads, whereby the angle cut into the rudder above the upper pintle is avoided, and the strength increased in the part where the grain of the wood forming the main piece is frequently weak from the timber not being of the exact curvature at that place.

(A) the rudder head as usually made, shewing in black the line formed on the cone by the proposed alteration; (B) the rudder and post as proposed to be fitted with a collar on the upper part of the upper pintle about 6 inches deep, to be bolted with two tie bolts through the lip of the cone and rudder; (C) a pintle not bolted, but only let into the rudder to show the formation of the collar.

Proposed by Mr. E. Wood, Foreman of the Yard, Devonport, and fitted in H.M.S. "PELORES" in 1856.

18. Four MODELS (A, B, C, D) showing a plan for substituting iron or mixed metal for the rudder head, in lieu of wood; also a plan for making the stern-post and rudder of metal.

Proposed by Mr. G. D. Banes, Foreman, Chatham. 1859.

19. Plan of a rudder for a line-of-battle ship.

By Mr. Fincham, Assistant Master Shipwright, Chatham Dockyard. 1858.

20. Plan for constructing a rudder with an iron head.

Proposed by Mr. P. D. Martin, of Simon's Town. 1859.

21. Round-headed rudder with propelling screw on the aft side (on a $\frac{3}{4}$ -in. scale).

By Commander R. H. Fleming, R.N. 1860.

22. MODELS showing a plan for steering a ship by means of a fan-shaped apparatus fitted on each side of the ship in such a manner that either of them may be extended or withdrawn at pleasure according to the direction in which it is desired to turn the ship.

Received from Capt. Boyd, R.N. 1860.

23. Rudder head. 1860.

24. Two rudders; one with iron head and iron norman head, the other with wood head and iron norman head and tillers. 1862.

25. Proposed plan for metal rudder, inner part three inches thick, back inch and a half. About 1861.

26. Stern fitted with auxiliary rudder.

By Mr. Henwood. 1861.

27. MODEL fitted with auxiliary rudders.

By Messrs. Seymour and Hatchers. 1862.

28. MODEL of a plan for fitting a balanced rudder pivoted on the keel. 1862.

29. Plan for steering iron or wooden ships with an iron rudder to be fitted on each side against the deadwood or fore post, the after or rudder post to be dispensed with.

Proposed by Mr. James Briscoe. 1862.

30. Plan for steering screw ships with two rudders one on each side of the ship before the screw aperture.

Proposed by Mr. P. Hill. 1862.

31. Plan for an auxiliary rudder in the bow, as fitted in the Portsmouth Packet-boat "PRINCESS ROYAL" in 1862.

Proposed by Commander Warren. 1862.

32. MODEL showing the proposed method of applying Commander Warren's bow rudder to H.M.S. "SHARP-SHOOTER." 1862.

33. Plan for an equilibrium rudder to be applied in the run of a ship on each side, either before or abaft the screw-propeller.

Proposed by Mr. J. Waterland, Chief Engineer, H.M.S. "PEMBROKE." 1862.

34. Plan for steering a ship by means of a rudder to be worked in a hole cut through the after deadwood immediately before the stern-post, the rudder being hung at the after instead of the fore edge; also a plan for giving motion to the rudder when so fitted.

Proposed by Mr. G. Wood. 1862.

35. MODEL of the Lumley rudder, showing Mr. Lumley's 1st or chain system. First fitted to the "BULLFINCH" gunboat at Portsmouth, October 1862, then applied to the "COLUMBINE" steam corvette, "LIZARD," "LOCUST," "OTTER," "ADDER," and other vessels.

Patented by Mr. Henry Lumley, Assoc., I.N.A.

36. Three MODELS (A, B, C) of the Lumley rudder, (A) showing the 2nd. or tiller piece system, (B) the 3rd. or yoke and arm system, and (C) the 3rd. system modified. Fitted to the "SHEERNESS" in 1864, and other vessels.

Patented by Mr. Henry Lumley, Assoc., I.N.A.

The Lumley rudder is the ordinary rudder divided in the direction of its length, and made by various methods to present a recessed surface to the current of water produced by the progress of the ship. It successfully increases steering power.

37. Plan for a balanced rudder with a stop or guard.

Proposed by Captain Broadhead. 1862.

38. Plan for steering a ship by means of a rudder working through a fore and aft water-tight trunk close by the keel, and as far forward as possible, which can be lowered down so that its upper edge may be below the lower side of the keel. The rudder revolves on its centre by means of an upright shaft to which it is attached.

Proposed by Mr. C. T. Oliver. 1862.

39. Stern fitted with two rudders before the screw.

By Captain J. Seccombe, R.N. 1862.

40. Steering screw propeller. By Mr. J. Howes. 1863.

41. Stern with two balanced rudders sliding up and down through the counter of the ship.

42. Proposed rudder with iron strengthening strap, for H.M.S. "BRUNSWICK." 1863.

43. Two MODELS showing proposed plan for hollowing the back of rudder post for iron-plated ships of the "NORTHUMBERLAND" class. 1863.

44. Rudder proposed for the "MINOTAUR" class. 1863.

45. Revolving and balanced rudder.

By Commander M. Shuldhham, R.N. 1863.

DIVISION B.

PLANS FOR TEMPORARY OR SPARE RUDDERS.

71. Two MODELS (A, B):—

(A) Temporary rudder.

Invented by Capt. Pakenham, R.N. 1792.

(B) Another, copied from it about 1857.

72. Temporary rudder, made after Captain Pakenham's.
By Mr. Edward Churchill. 1793.

73. Temporary rope and lanyard rudder, with cross pieces. 1830.

74. Temporary rudder made from spare main topmast, and yard-arm pieces. (On an inch scale.)

75. Temporary rudder, fitted at sea on board the "BRITANNIA," one of the Liverpool and New York packets.
By Capt. H. Marshall. 1827.

76. Temporary rudder, with sketch.

By Lieut. H. J. Carr, R.N.

77. Temporary rudder made of spare spars.

78. Stern, stern-post, and two copper temporary rudders at the side.

79. Temporary rudder made with spare spars, and tackling to work it.

80. Temporary rudder, made with spare spars and topmast cap for pintle and brace.

81. Two temporary rudders, the inner mainpiece with the pintles fitted on.
By Mr. Cheeseman. 1832

82. Temporary rudder. By Mr. Aldrick.

83. Temporary rudder, with rope and spare topmast for rudder head.

84. Temporary rudder, by which a Portuguese steamer was steered home from the Pacific Ocean.

Copied from a model in Lisbon Dockyard, by Lieut. C. Nelson, R.N., of H.M.S. "HASTINGS," 1836.

85. Temporary rudder, made with round spars at right angles, the centre piece a spare main topmast.

By Mr. Richard Blake. 1836.

86. Three MODELS (1, 2, 3). 2 and 3 show two plans for constructing temporary rudders; 1 shows the mode of constructing the permanent rudder.

87. Three MODELS (A, B, C). (A) shows a plan for constructing a temporary rudder of spare spars when there is no spare inner piece at hand; (B) a plan when there is a spare inner piece on board; and (C) shows the permanent rudder which the above are intended to replace.

Proposed by Mr. R. Hunt. 1840.

88. Stern and two temporary rudders, inner piece of rudder with pintles on. 1842.

89. Stern post with braces, showing a plan for driving out the broken parts of the pintles left in the braces when the rudder is torn off at sea.

90. Temporary rudder, inner piece made of topmast. 1850.

91. Two MODELS, showing a plan for making a temporary rudder by means of a hempen cable cased over with wood, and hung by means of chain and rope guys attached to the back of the rudder.

By the rudder which these models represent the American packet "WARREN" was steered for 63 days.

Proposed by Capt. J. G. Lawton. 1852.

92. Two MODELS (A and B) and a drawing of a spare round-headed rudder. (A) shows the rudder when put together; (B) shows the mode of stowing away between the beams the pieces of which the rudder is composed.

Proposed by Mr. Richard Hunt, Plymouth Yard. 1855.

93. Plan for lowering a temporary rudder down the screw aperture of a vessel propelled by a screw, in case of her touching a rock with the heel of the rudder post and disabling her rudder and screw.

Proposed by Mr. J. E. Binsted. 1858.

94. Spare rudder, to be made of iron.

Proposed by Mr. W. H. Fosberg. 1863.

DIVISION C.

PLANS FOR SECURING THE RUDDER TO THE SHIP.

111. Four pairs of pintles and braces for 74-gun ships.
Recommended by Sir Robert Seppings in 1806,
and generally adopted.

112. Rudder head and stern, and rudder and stern post, showing a method of securing the rudder by a cross piece inside above the tiller, and two palls at the head, in the event of the ship striking the ground.

Suggested by Mr. J. Clark.

113. Round-headed rudder, stern post, and part of stern, showing Capt. Lihou's plan of pintles and braces.

114. Method of securing the lower part of the rudder in the event of losing the pintles. 1830.

115. Round-headed rudder, stern post, and part of dead wood, with pintle passing through four braces, the tiller steering under deck.

116. Short round-headed rudder with pintle and brace.

117. Stern post with a hole prepared for attaching a spring or cable under water.

By Capt. George Smith, R.N. 1845.

118. Round-headed rudder, with long moveable pintle passing down through the rudder head and the whole of the braces.

119. Permanent rudder, the lower part made to slide up to a new position in the event of the ship touching the ground.

By Messrs. Goldie and Son, Pittenweem, Fifeshire.

120. Permanent rudder and stern post, with hooks through each pintle to prevent the rudder unshipping, and chains to keep it to a certain angle.

DIVISION D.

PLANS FOR WORKING AND PAULING THE
RUDDER.

141. Round-headed rudder, showing proposed mode of pauling.

142. Rudder and stern post, showing a mode of dispensing with a wood lock.

143. Plan for raising and lowering the rudder at pleasure, without disturbing the steering gear.

144. Three-round headed rudders, showing a method of locking the same in any position by means of a drop paul.

By Mr. William Ball.

145. Half stern of 74-gun ship, with long iron tiller, shewing the increase in the diameter of the barrel of steering wheel, caused by lengthening the tiller.

By Sir Robert Seppings. 1821.

146. Circular stern, showing a plan for securing the helm-port by a loop for tiller to slide in for 74-gun ships, with a norman head to steer above rudder head.

By Mr. Gibbon, Carpenter, H.M.S. "ASIA." 1825.

147. Square stern, with tiller and loop, for 74-gun ships.

By Mr. Gibbon.

148. Round-headed rudder, showing a method of pauling the rudder, and also of preventing its rising, by an iron frame over the head of the rudder.

By Mr. Spiller, Foreman, Chatham Yard. 1826.

149. Plan for working the tiller of a brig under the beams. 1830.

150. Part of stern, with round-headed rudder and square tiller hole, showing the method of pauling the same, with circular plates and a pin.

By Mr. John Edye, Chatham Dockyard. 1830.

151. Part of stern, with round-headed rudder and spare tiller hole, with flap outside of rudder to keep out the sea, and wood chock on each side of upper tiller hole to pull the same.

By Mr. Rice, Chatham Dockyard. 1830.

152. Half stern, with long tiller, and wheel of increased diameter in the barrel.

By Sir Robert Seppings. 1831.

153. Round-headed rudder, with iron paul-plates at the after side of rudder head.

By Mr. John Edye. 1834.

Sent to Portsmouth 1836, and fitted to H.M.S. "QUEEN."

- 154.** Steering wheel for large ships in common use.
About 1840.
- 155.** Rudder head with temporary tiller, fitted to the aft side on board the "HOGUE." 1846.
- 156.** Steering apparatus, as fitted to H.M. Yacht "VICTORIA AND ALBERT."
By Mr. John Edye, Assistant Surveyor of the Navy.
1846.
- 157.** Round-headed rudder for a 74-gun ship, with tiller fitted to the after part for steering, in the event of the main tiller being carried away.
By Mr. Oliver Lang. 1846.
- 158.** Half model of stern, with yoke.
By Lieut. A. G. Edye, R.N. 1846.
- 159.** Plan for fitting a yoke tiller, and for pauling the rudder in screw steam vessels.
Proposed by Lieut. A. G. Edye, R.N., in 1849, and adopted in H.M.S. "DESPERATE" fitted at Woolwich in 1850, and in H.M.S. "SANSPAREIL" fitted at Devonport in 1851.
- 160.** After part of the main deck of the "TRIBUNE," explanatory of a suggestion for steering screw propelled ships when there is not room for working a yoke or tiller between the trunk and the stern.
By Mr. George Netherwood, Foreman of Sheerness Yard. 1852.
- 161.** Arrangement of yoke in H.M.S. "AGAMEMNON," to avoid cutting the stern timbers and screw-well.
Proposed by Mr. Nathaniel Barnaby, Draughtsman, Sheerness. 1852.
- 162.** Rudder head, with a metal tiller fitted to the aft side, showing a plan for steering ships when the rudder head is damaged. 1853.
- 163.** Steering apparatus.
By Mr. O. Moore, Sneinton, Nottingham. 1854.
- 164.** Plan for increasing the leverage of the tiller in screw ships.
By Mr. Benjamin Bennett, Carpenter, R.N. 1859.
- 165.** Two MODELS showing Admiral Martin's plan of steering apparatus as fitted to H.M.S. "TERMAGANT," "BACCHANTE," "ST. GEORGE," &c. 1858.
- 166.** Two MODELS (A and B), (on a $\frac{1}{2}$ -inch scale) of steering apparatus for H.M.S. "ST. GEORGE." (A) shows the

steering apparatus arranged on the plan of Admiral Martin, which was fitted to H.M.S. "TERMAGANT," but which would seriously wound the post timber; (B) shows a modification of the above plan intended to effect the same purpose with certain advantages over that fitted to the "TERMAGANT."

Plan (B) was proposed by Mr. James Peake, Master Shipwright, Devonport, in 1859, but not adopted.

167. Double cone steering barrel as fitted to H.M.S. "BARRACOUTA" in 1858.

Proposed by Mr. Thos. McSweney.

168. An arrangement for increasing the power of the apparatus for working the rudder in ships of the line and large frigates.

Proposed by Mr. J. Edwards, Assistant Master Shipwright, Devonport Yard. 1860.

169. Plan for fitting the yoke in H.M.S. "AURORA," as the straps of the yoke could not be fitted in two pieces in the usual manner for the yoke to work clear of and under the main deck beams.

Proposed by the Officers of Pembroke Yard in 1860.

170. Proposed steering apparatus. 1861.

171. Plan of a steering apparatus to dispense with the norman head and the tiller in the ward room of two-decked ships, or in the captain's cabin in frigates, without decreasing the power of working the rudder.

Proposed by Mr. J. H. Row, Foreman of the Yard, Keyham, and ordered to be tried on board H.M.S. "PHOEBE" in 1861.

172. Plan for fitting the apparatus for steering a ship so that the whole of it may in time of action be entirely under water; a yoke or tiller to be fitted to the heel of the rudder, and worked by chains passing through tubes in the ship's bottom. Proposed by Mr. G. Murdoch. 1862.

173. Steering apparatus suggested for H.M.S. "TRIUMPH," or any vessel where for want of room it is inconvenient to use the ordinary yoke or tiller. 1863.

174. Double steering wheel.

By Mr. W. B. Robinson. 1863.

175. Steering apparatus, designed for preventing slack rope in a yoke. 1863.

176. Method of steering ships by steam.

Proposed by Mr. F. Martin. 1863.

CLASS IX.

Models of various Plans for the Propulsion of Ships.

Divisions.

- | | |
|---------------------------------------|-------------------------------------|
| A.—Plans for paddle-wheel propellers. | C.—Miscellaneous plans in connexion |
| B.—Plans for screw propellers. | with the propulsion of ships. |

DIVISION A.

PLANS FOR PADDLE-WHEEL PROPELLERS.

1. Wheel with three tiers of paddles, made to enter the water vertically.
By Mr. A. M. Skene.
2. Midship section with paddles in centre.
By Commander R. H. Fleming, R.N. 1830.
3. Steam vessel fitted with paddles to work vertically, and intended to feather after making a stroke.
By Mr. Skene, Durham. 1830.
4. Four paddle-sweeps to be worked on a fore-and-aft line.
By Commander R. H. Fleming, R.N. 1830.
5. Four paddles driven by horizontal cogs.
6. Midship section showing four floats driven by up-and-down motion.
7. Rough block stern, with paddle wheel under the counter.
By Commander Fleming, R.N.
8. Steam vessel with paddle wheel fitted in midships, with two keels and rudders. 1830.
9. Improved paddle wheel, with concentric and arms to drive the paddles vertically.
By Mr. Morgan.
10. Jointed horizontal paddles, to impel a vessel fitted with a steam engine as a principal or auxiliary power.
By Mr. J. T. Hodgson, St. George's, Westminster.
11. Single paddle or propeller.

12. Two paddle wheels, with one rim of each wheel having an eccentric motion which alters the position of the paddles as they enter and leave the water.

13. Midship section of a paddle-box, with the sponson and common wheel, to unship arms.

Proposed by Lieutenant W. H. Church. 1850.

14. Paddle-box fitted with three sweeps. 1853.

15. Paddle wheel with eccentric and arms, to drive the floats vertical. By Messrs. Seaward & Co. 1862.

16. Midship section, fitted with paddle wheels and direct engine. 1863.

17. Metal paddle wheel, with plan for the paddles to feather.

DIVISION B.

PLANS FOR SCREW PROPELLERS

30. Plan of an Archimedian screw. By Mr. F. P. Smith. This Model shows the first screw as applied to the "ARCHIMEDES" in 1838. It was afterwards superseded by one of the same diameter and pitch, (5 ft. 9 in. diameter, and 8 ft. pitch), but divided into a screw of two half turns, i.e., a double-threaded screw, by which it was reduced to one-half the length of the one entire turn, making it just 4 feet long instead of 8 feet. The same screw was subsequently cut down by degrees until it was reduced to 16 inches, or one-sixth of its original length, and these proportions became very generally adopted in the naval and mercantile marine of this country.

31. Plan of an Archimedian screw.

32. Steam vessel fitted with a three-fan screw in the after dead wood.

33. Steam vessel with screw on each side under the counter.

34. Small screw propeller, fixed in a brass frame. 1850.

35. Three Models, showing the plan for shaping screw propellers to one, two, and three threads. 1850.

36. Two Models, showing the pitch of a screw.

By Mr. Large, Assistant Constructor of the Navy.

37. Plan of a propeller. 1855.

38. Steam vessel fitted with two screw propellers under the stern, with side protectors.

By Mr. J. Dudgeon. 1862.

39. Plan for a screw propeller.

Proposed by Mr. J. Thomson. 1862.

DIVISION C.

MISCELLANEOUS PLANS IN CONNEXION WITH THE PROPULSION OF SHIPS.

50. Plan for propelling ships by cranks and paddle wheels worked by manual labour.

By Captain Napier, R.N., by which he propelled the "GALATEA" frigate out of Portsmouth Harbour in 1835.

51. Vessel fitted with wind sails to drive the paddles.

Proposed by Lieutenant Rawstorne, R.N. 1830.

52. Mode of working paddle wheels by a capstan.

By Commander Fleming, R.N. 1830.

53. Rowing machine or paddle.

By a German, (name not deciphered).

54. Single paddle, worked by crank and cog-wheels.

By Commander Fleming, R.N., H.M.S. "OCEAN," Sheerness.

55. Frame of a vessel, with propellers worked by fore-and-aft motion under water each side of keel.

By Mr. John Bestwick, Dedham, Massachusetts, formerly of Nottingham.

56. Plan for fitting and working a screw propeller by the capstan in sailing vessels, and for working the chain pumps by connecting them to the propeller shaft.

Proposed by Commander Inglefield. 1850.

57. Rigged vessel propelled by oars, to supersede steam on the narrow rivers on the coast of Africa.

By Commander Edward Wilson, R.N.

58. Two MODELS (A. and B., not to scale). A., the nozzle; B., the protection for the nozzle for a vessel to be fitted, to be propelled by pumping water out of her.

Proposed by Admiral Elliot. 1863.

CLASS X.

Masts and Rigging.

- A.—Models showing the rig of vessels at various periods.
- B.—The masts, yards, tops, cross-trees, trestle-trees, caps, &c., according to the classification of Sir W. Symonds in 1836.*
- C.—Plans for stepping lower masts.
- D.—Plans for raising, lowering, and fidding topmasts, topgallant masts, &c.
- E.—Plans for making, strengthening, and fitting lower masts.
- F.—Plans for making, strengthening, and fitting topmasts, topgallant masts, &c.
- G.—Plans for making, strengthening, and fitting bowsprits.
- H.—Plans for making, strengthening, and fitting gaffs and booms.
- I.—Plans for making, strengthening and fitting yards.
- K.—Plans for mast-heads, tops, cross-trees, trestle-trees, and caps.
- L.—Plans for fitting channels, shrouds, and stays, including dead-eyes, hearts, and thimbles.
- M.—Blocks and sheaves.
- N.—Specimens of rope, &c., for rigging.
- O.—Specimens of canvas for sails.
- P.—Models of masts, &c., showing the damage sustained by them in engagements with the enemy.
- Q.—All models in connexion with masts and rigging not included in the foregoing divisions.

DIVISION A.

MODELS SHOWING THE RIG OF VESSELS AT VARIOUS PERIODS.

1. MODEL, (on about a $\frac{1}{12}$ in. scale), of the rig of a line-of-battle ship ("GREAT HARRY"), of the year 1514. This vessel had four masts. No English ship before that date is known to have carried more than one mast. (See Class I, Division A, No. 1.)

2. MODEL, (on a $\frac{1}{4}$ in. scale), of the rig of a line-of-battle ship ("ROYAL WILLIAM"), of the year 1670. (See Class I, Division A, No. 4.)

3. MODEL, (on a $\frac{1}{4}$ in. scale), of the rig of a line-of-battle ship ("ROYAL WILLIAM"), of the year 1712. (See Class I, Division A, No. 7.)

4. MODEL, (on a $\frac{1}{3}$ in. scale), of the rig of a line-of-battle ship ("VICTORY"), of the year 1737. (See Class I, Division A, No. 9.)

5. MODEL, (on a $\frac{1}{12}$ in. scale), of the rig of a line-of-battle ship ("VICTORY"), of the year 1765. (See Class I, Division A, No. 12.)

6. MODEL, (on a $\frac{1}{2}$ in. scale), of the rig of a frigate (the yacht "ROYAL ADELAIDE"), of the year 1833. (See Class I, Division A, No. 131.)

* See note on next page.

7. MODEL, (on a $\frac{1}{2}$ in. scale), of the rig of a line-of-battle ship ("QUEEN"), of the year 1839. (See Class I., Division A., No. 23.)

8. MODEL (on a $\frac{1}{4}$ in. scale), of the rig of an iron cased ship ("WIVERN") with *Tripod* masts, of the year 1865, on the plan of Captain C. P. Coles, R.N. (See Class I., Division A., No. 156.)

DIVISION B.

THE MASTS, YARDS, TOPS, CROSS-TREES, TRESTLE-TREES, CAPS, &c., ACCORDING TO THE CLASSIFICATION OF SIR W. SYMONDS.*

(The scale of all the models in this division is $\frac{2}{3}$ in. to a foot.)

MAINMASTS, BOWSPRITS, GAFFS, AND BOOMS.†

1. Three-decked ship, 1st class (A.).

	Length.			Diameter.	
	ft.	in.		in.	
(a.) Mainmast - -	128	3	-	-	42
(b.) Bowsprit - -	77	4	-	-	41
(c.) Jib-boom - -	53	0	-	-	$16\frac{1}{2}$
(d.) Flying jib-boom -	55	0	-	-	10
(e.) Gaff - -	51	0	-	-	$11\frac{1}{2}$
(f.) Spanker-boom -	72	0	-	-	$16\frac{1}{2}$

* At one time there were eighty-eight distinct establishments of masts, yards, and sails for the ships and vessels constituting Her Majesty's Navy, and knowing how difficult it then was for one ship, in case of emergency, to supply another although of the same class, and how expensive and inconvenient it was both in the home and foreign yards to keep up a supply of stores and furniture suitable to so many varying dimensions, Sir Wm. Symonds, in 1836, formed this scale of 20 establishments so as to suit for all the upper spars of the ships and vessels of all classes forming the navy. The spars at present in use are almost entirely of the dimensions herein named; but as a rule, where the topmasts, top-gallant masts, and lower yards are taken from Sir Wm. Symonds's classification, the topsail yard would be that corresponding to the next class above it, the top-gallant yard two classes above it, and the royal yard three classes above it.

† Sir Wm. Symonds's classification did not apply strictly to these spars, as it did to the topmasts, top-gallant masts, yards, caps, &c. (see page 208), but on the adoption of his proposal, the dimensions here given for these spars were the sizes which, in practice, it was found were most generally used, and it was therefore spars of these dimensions which were generally kept in store, though lower masts, &c., of other dimensions were sometimes required. (See also foot-note at page 212.)

2. Three-decked ship, 1st class (B.).

	Length.		Diameter.
	ft.	in.	in.
(a.) Mainmast -	125	3	40
(b.) Bowsprit -	75	5	40
(c.) Jib-boom -	52	6	16
(d.) Flying jib-boom -	54	6	9½
(e.) Gaff -	49	0	11
(f.) Spanker-boom -	70	0	16

3. Three-decked ship, 2nd class.

	Length.		Diameter.
	ft.	in.	in.
(a.) Mainmast -	123	7	40
(b.) Bowsprit -	72	6	40
(c.) Jib-boom -	51	0	16
(d.) Flying jib-boom -	54	6	9½
(e.) Gaff -	47	0	11
(f.) Spanker-boom -	66	6	15½

4. Two-decked ship, 1st class.

	Length.		Diameter.
	ft.	in.	in.
(a.) Mainmast -	122	0	40
(b.) Bowsprit -	72	6	40
(c.) Jib-boom -	49	0	16
(d.) Flying jib-boom -	53	2	9
(e.) Gaff -	47	0	11
(f.) Spanker-boom -	70	0	16

5. Two-decked ship, 2nd class.

	Length.		Diameter.
	ft.	in.	in.
(a.) Mainmast -	114	4	38
(b.) Bowsprit -	68	6	38
(c.) Jib-boom -	49	0	16
(d.) Flying jib-boom -	52	6	9
(e.) Gaff -	47	0	11
(f.) Spanker-boom -	66	6	15½

6. Two-decked ship, 3rd class.

	Length.		Diameter.
	ft.	in.	in.
(a.) Mainmast -	112	6	37
(b.) Bowsprit -	66	3	36
(c.) Jib-boom -	47	0	15½
(d.) Flying jib-boom -	51	8	8½
(e.) Gaff -	45	0	10½
(f.) Spanker-boom -	64	0	15

7. Frigate, 1st class.

		Length.		Diameter.
		ft.	in.	
(a.)	Mainmast -	- 109	11 -	- 37
(b.)	Bowsprit -	- 63	9 -	- 36
(c.)	Jib-boom -	- 47	0 -	- 15 $\frac{1}{2}$
(d.)	Flying jib-boom -	- 51	8 -	- 8 $\frac{3}{4}$
(e.)	Gaff -	- 45	0 -	- 10 $\frac{1}{2}$
(f.)	Spanker-boom -	- 64	0 -	- 15

8. Frigate, 2nd class.

		Length.		Diameter.
		ft.	in.	
(a.)	Mainmast -	- 105	5 -	- 35
(b.)	Bowsprit -	- 61	3 -	- 33
(c.)	Jib-boom -	- 45	6 -	- 14 $\frac{1}{2}$
(d.)	Flying jib-boom -	- 48	4 -	- 8 $\frac{1}{2}$
(e.)	Gaff -	- 43	0 -	- 10
(f.)	Spanker-boom -	- 61	0 -	- 14 $\frac{1}{2}$

9. Frigate, 3rd class.

		Length.		Diameter.
		ft.	in.	
(a.)	Mainmast -	- 98	10 -	- 32
(b.)	Bowsprit -	- 59	8 -	- 30
(c.)	Jib-boom -	- 43	6 -	- 14
(d.)	Flying jib-boom -	- 47	8 -	- 8 $\frac{1}{2}$
(e.)	Gaff -	- 41	0 -	- 9
(f.)	Spanker-boom -	- 58	0 -	- 13 $\frac{1}{2}$

10. Frigate, 4th class.

		Length.		Diameter.
		ft.	in.	
(a.)	Mainmast -	- 96	1 -	- 32
(b.)	Bowsprit -	- 56	9 -	- 30
(c.)	Jib-boom -	- 42	0 -	- 13 $\frac{1}{2}$
(d.)	Flying jib-boom -	- 45	2 -	- 8
(e.)	Gaff -	- 39	0 -	- 8 $\frac{1}{2}$
(f.)	Spanker-boom -	- 55	6 -	- 13

11. Frigate, 5th class.

		Length.		Diameter.
		ft.	in.	
(a.)	Mainmast -	- 92	7 -	- 30
(b.)	Bowsprit -	- 54	4 -	- 28
(c.)	Jib-boom -	- 40	6 -	- 13
(d.)	Flying jib-boom -	- 43	6 -	- 7 $\frac{1}{2}$
(e.)	Gaff -	- 37	0 -	- 8 $\frac{1}{2}$
(f.)	Spanker-boom -	- 51	6 -	- 12

12. Frigate, 6th class.

	Length.		Diameter.
	ft.	in.	in.
(a.) Mainmast - -	89	3 -	28
(b.) Bowsprit - -	50	0 -	26
(c.) Jib-boom - -	37	0 -	12
(d.) Flying jib-boom -	39	6 -	7
(e.) Gaff - -	34	0 -	8
(f.) Spanker-boom -	48	6 -	11½

13. Frigate, 7th class, and Corvette, 1st class (A.).

	Length.		Diameter.
	ft.	in.	in.
(a.) Mainmast - -	86	0 -	26
(b.) Bowsprit - -	45	3 -	26
(c.) Jib-boom - -	36	0 -	11½
(d.) Flying jib-boom -	38	4 -	6½
(e.) Gaff - -	32	0 -	7½
(f.) Spanker-boom -	44	0 -	10½

14. Frigate, 7th class, and Corvette, 1st class (B.).

	Length.		Diameter.
	ft.	in.	in.
(a.) Mainmast - -	84	2 -	26
(b.) Bowsprit - -	45	6 -	24
(c.) Jib-boom - -	34	6 -	10
(d.) Flying jib-boom -	37	2 -	6½

15. Frigate, 8th class.

	Length.		Diameter.
	ft.	in.	in.
(a.) Mainmast - -	73	4 -	24
(b.) Bowsprit - -	43	6 -	23
(c.) Jib-boom - -	33	0 -	10½
(d.) Flying jib-boom -	35	6 -	6½
(e.) Gaff - -	31	0 -	7
(f.) Spanker-boom -	41	6 -	10

16. Corvette, 2nd class.

	Length.		Diameter.
	ft.	in.	in.
(a.) Mainmast - -	71	7 -	24
(b.) Bowsprit - -	43	6 -	23
(c.) Jib-boom - -	33	0 -	10½
(d.) Flying jib-boom -	35	6 -	6½
(e.) Gaff - -	31	0 -	7
(f.) Spanker-boom -	41	6 -	10

17. Brig, 1st class.

	Length.		Diameter.
	ft.	in.	in.
(a.) Mainmast - -	73	3 -	- 24
(b.) Bowsprit - -	43	6 -	- 23
(c.) Jib-boom - -	33	0 -	- 10 $\frac{1}{2}$
(d.) Flying jib-boom -	35	6 -	- 6 $\frac{1}{4}$
(e.) Gaff - -	39	0 -	- 8 $\frac{1}{2}$
(f.) Main-boom - -	59	0 -	- 13 $\frac{1}{2}$

18. Brig, 2nd class.

	Length.		Diameter.
	ft.	in.	in.
(a.) Mainmast - -	72	8 -	- 23
(b.) Bowsprit - -	42	0 -	- 22
(c.) Jib-boom - -	30	0 -	- 9
(d.) Flying jib-boom -	32	0 -	- 6
(e.) Gaff - -	37	0 -	- 8 $\frac{1}{2}$
(f.) Main-boom - -	57	0 -	- 13 $\frac{1}{2}$

19. Brig, 3rd class.

	Length.		Diameter.
	ft.	in.	in.
(a.) Mainmast - -	65	3 -	- 20
(b.) Bowsprit - -	36	6 -	- 18
(c.) Jib-boom - -	28	0 -	- 8
(d.) Flying jib-boom -	30	0 -	- 5 $\frac{3}{4}$
(e.) Gaff - -	34	0 -	- 8
(f.) Main-boom - -	51	0 -	- 12

20. Packet.

	Length.		Diameter.
	ft.	in.	in.
(a.) Mainmast - -	59	1 -	- 20
(b.) Gaff - -	32	4 -	- 7
(c.) Main-boom - -	48	2 -	- 10 $\frac{1}{2}$

TOPMASTS, YARDS, TOPS, CROSS-TREES, TRESTLE-TREES,
and CAPS.***21.** First Class.

(For the mainmasts of three-decked ships 1st class A, and two-decked ships 1st class.)

	Length.		Diameter.
	ft.	in.	in.
(a.) Topmast - -	73	6 -	- 22
(b.) Top-gallant and Royal mast - -	55	0 -	- 13

* Besides what are here mentioned there were some few additional sizes (as far as diameter is concerned) for fore-topmasts, but with this exception, for all these spars and fittings in this Division the dimensions given in these 20 classes were the only sizes used for the whole of the ships in Her Majesty's Navy. (See also foot-note at page 208.)

			Length.		Breadth.		Depth.	
			ft.	in.	ft.	in.	ft.	in.
(c.)	Lower yard	- - -	110	0	-	-	27	0
(d.)	Topsail yard	- - -	78	0	-	-	16	6
(e.)	Top-gallant yard	- - -	49	0	-	-	11	6
(f.)	Royal yard	- - -	34	0	-	-	7	0
(g.)	Tops	- - -	16	0	25	0	0	6
(h.)	Lower trestle-trees	- - -	15	8	1	3	1	10
(i.)	Lower cross-trees	{ after	25	9	1	4	0	10
		{ fore	25	5	1	4	0	10
(k.)	Lower caps	- - -	7	4	3	9	1	10
(l.)	Topmast trestle-trees	- - -	6	2	0	5½	0	11
(m.)	Topmast cross-trees	{ after	18	2	0	6	0	4½
		{ fore	14	6	0	6	0	4½
(n.)	Topmast caps	- - -	4	5	2	2	1	0

22. Second Class.

(For the mainmast of three-decked ships 2nd class, and of two-decked ships 2nd class.)

	Length.		Diameter.	
	ft.	in.	ft.	in.
(a.) Topmast - - -	70	6	-	22
(b.) Top-gallant and Royal mast - - -	52	6	-	12½
(c.) Lower yard - - -	105	0	-	25
(d.) Topsail yard - - -	74	0	-	16
(e.) Top-gallant yard - - -	46	0	-	11
(f.) Royal yard - - -	32	6	-	6½

			Length.		Breadth.		Depth.	
			ft.	in.	ft.	in.	ft.	in.
(g.)	Tops	- - -	15	0	25	6	0	6
(h.)	Lower trestle-trees	-	15	0	1	2	1	10
(i.)	Lower cross-trees	{ after	24	9	1	4	0	10
		{ fore	21	10	1	4	0	10
(k.)	Lower caps	-	7	4	3	8	1	8
(l.)	Topmast trestle-trees	-	5	8	0	5½	0	10
(m.)	Topmast cross-trees	{ after	17	6	0	5	0	4
		{ fore	13	10	0	5	0	4
(n.)	Topmast caps	-	4	4½	2	1½	0	11½

23. Third Class.

(For the mainmast of three-decked ships 3rd class, and of two-decked ships 3rd class.)

	Length.		Diameter.	
	ft.	in.	ft.	in.
(a.) Topmast - - -	67	6	-	21½
(b.) Top-gallant and Royal mast -	51	0	-	12
(c.) Lower yard - - -	100	0	-	24
(d.) Topsail yard - - -	71	0	-	15½
(e.) Top-gallant yard - - -	45	0	-	11
(f.) Royal yard - - -	31	6	-	6½

			Length.		Breadth.		Depth.	
			ft.	in.	ft.	in.	ft.	in.
(g.)	Tops	- -	14	6	24	6	0	6
(h.)	Lower trestle-trees	-	14	6	1	1½	1	9
(i.)	Lower cross-trees	after	23	1	1	2½	0	9
		fore	21	0	1	2½	0	9
(k.)	Lower caps	- -	7	4	3	8	1	7
(l.)	Topmast trestle-trees	-	5	5	0	5	0	9½
(m.)	Topmast cross-trees	after	17	0	0	5	0	4
		fore	13	2	0	5	0	4
(n.)	Topmast caps	- -	4	0	2	0	0	10

24. Fourth Class.

(For the mainmast of two-decked ships 4th class, and of frigates 1st class.)

			Length.		Diameter.	
			ft.	in.	in.	
(a.)	Topmast	- -	65	0	-	21½
(b.)	Top-gallant and Royal mast	- -	49	0	-	12
(c.)	Lower yard	- -	96	0	-	23
(d.)	Topsail yard	- -	68	0	-	15
(e.)	Top-gallant yard	- -	43	0	-	10
(f.)	Royal yard	- -	30	6	-	6

			Length.		Breadth.		Depth.	
			ft.	in.	ft.	in.	ft.	in.
(g.)	Tops	- -	14	0	23	6	0	6
(h.)	Lower trestle-trees	-	14	0	1	1	1	6½
(i.)	Lower cross-trees	after	22	0	1	2	0	9
		fore	20	2	1	2	0	9
(k.)	Lower caps	- -	7	4	3	8	1	7
(l.)	Topmast trestle-trees	-	5	4	0	4	0	8½
(m.)	Topmast cross-trees	after	16	6	0	5	0	4½
		fore	13	0	0	5	0	4½
(n.)	Topmast caps	- -	3	10	1	10	0	9

25. Fifth class.

(For the mainmast of frigates 2nd class.)

			Length.		Diameter.	
			ft.	in.	in.	
(a.)	Topmast	- -	62	6	-	20½
(b.)	Top-gallant and Royal mast	- -	47	0	-	11½
(c.)	Lower yard	- -	91	0	-	22
(d.)	Topsail yard	- -	65	0	-	14½
(e.)	Top-gallant yard	- -	41	6	-	10
(f.)	Royal yard	- -	29	6	-	6

			Length.		Breadth.		Depth.	
			ft.	in.	ft.	in.	ft.	in.
(g.)	Tops	- - -	13	6	22	6	0	5½
(h.)	Lower trestle-trees	- - -	13	7	1	1	1	6
(i.)	Lower cross-trees	{ after	21	9	1	2	0	9
		{ fore	20	1	1	2	0	9
(k.)	Lower caps	- - -	7	0	3	4	1	5
(l.)	Topmast trestle-trees	- - -	5	2	0	4	0	8½
(m.)	Topmast cross-trees	{ after	15	10	0	5	0	4
		{ fore	12	4	0	5	0	4
(n.)	Topmast caps	- - -	3	11	2	0	0	9

26. Sixth class.

(For the mainmast of frigates 3rd class.)

			Length.		Diameter.	
			ft.	in.	in.	
(a.)	Topmast	- - -	59	6	-	19½
(b.)	Top-gallant and Royal mast	- - -	45	0	-	11
(c.)	Lower yard	- - -	86	0	-	21
(d.)	Top-sail yard	- - -	62	0	-	13½
(e.)	Top-gallant yard	- - -	40	0	-	9½
(f.)	Royal yard	- - -	28	6	-	6

			Length.		Breadth.		Depth.	
			ft.	in.	ft.	in.	ft.	in.
(g.)	Tops	- - -	13	1	21	6	0	5
(h.)	Lower trestle-trees	- - -	13	1	1	1	1	5½
(i.)	Lower cross-trees	{ after	20	9	1	2	0	9
		{ fore	19	3	1	2	0	9
(k.)	Lower caps	- - -	6	7	3	3	1	4
(l.)	Topmast trestle-trees	- - -	5	0	0	4	0	8
(m.)	Topmast cross-trees	{ after	15	4	0	5	0	4
		{ fore	11	10	0	5	0	4
(n.)	Topmast caps	- - -	3	9	1	11	0	8

27. Seventh class.

(For the mainmast of frigates 4th class.)

			Length.		Diameter.	
			ft.	in.	in.	
(a.)	Topmast	- - -	57	6	-	18½
(b.)	Top-gallant and Royal mast	- - -	43	6	-	10½
(c.)	Lower yard	- - -	82	6	-	20
(d.)	Top-sail yard	- - -	59	0	-	13
(e.)	Top-gallant yard	- - -	38	0	-	9
(f.)	Royal yard	- - -	27	6	-	5

			Length.		Breadth.		Depth.	
			ft.	in.	ft.	in.	ft.	in.
(g.)	Tops	- - -	12	6	20	8	0	5
(h.)	Lower trestle trees	- - -	12	6	1	1	1	5½
(i.)	Lower cross-trees	- {after	20	1	1	2	0	9
		- {fore	19	2	1	2	0	9
(k.)	Lower caps	- - -	6	4	3	2	1	2
(l.)	Topmast trestle-trees	- - -	4	8	0	4	0	8
(m.)	Topmast cross-trees	- {after	14	4	0	5	0	4½
		- {fore	11	1	0	5	0	4½
(n.)	Topmast caps	- - -	3	6	1	10	0	8

28. Eighth class.

(For the mainmast of frigates 5th class.)

			Length.		Diameter.
			ft.	in.	in.
(a.)	Topmast	- - -	55	0	18
(b.)	Top-gallant and Royal mast	- - -	42	0	10
(c.)	Lower yard	- - -	78	6	19
(d.)	Topsail yard	- - -	56	6	12½
(e.)	Top-gallant yard	- - -	36	6	8½
(f.)	Royal yard	- - -	26	6	5½

			Length.		Breadth.		Depth.	
			ft.	in.	ft.	in.	ft.	in.
(g.)	Tops	- - -	12	0	19	10	0	5
(h.)	Lower trestle-trees	- - -	12	0	1	1	1	5½
(i.)	Lower cross-trees	- {after	19	2	1	2	0	9
		- {fore	17	6	1	2	0	9
(k.)	Lower caps	- - -	6	2	3	1	1	2
(l.)	Topmast trestle-trees	- - -	4	6	0	4	0	7
(m.)	Topmast cross-trees	- {after	13	7	0	5	0	4
		- {fore	10	7	0	5	0	4
(n.)	Topmast caps	- - -	3	5	1	9	0	7½

29. Ninth class.

(For the mainmast of frigates 6th class.)

			Length.		Diameter.
			ft.	in.	in.
(a.)	Topmast	- - -	52	6	17
(b.)	Top-gallant and Royal mast	- - -	40	6	9½
(c.)	Lower yard	- - -	74	6	18
(d.)	Topsail yard	- - -	54	0	12
(e.)	Top-gallant yard	- - -	35	0	8½
(f.)	Royal yard	- - -	25	6	5

		Length.		Breadth.		Depth.		
		ft.	in.	ft.	in.	ft.	in.	
(g.)	Tops - - - -	11	6	10	0	0	4½	
(h.)	Lower trestle-trees -	11	6	1	1	1	5½	
(i.)	Lower cross-trees - - {	after	18	4	1	2	0	9
		fore	16	6	1	2	0	9
(k.)	Lower caps - - -	5	10	3	0	1	2	
(l.)	Topmast trestle-trees -	4	4	0	4	0	7	
(m.)	Topmast cross-trees - - {	after	13	1	0	4½	0	3½
		fore	10	3	0	4½	0	3½
(n.)	Topmast caps - - -	3	2	1	6½	0	7	

30. Tenth class.

(For the mainmast of frigates 7th class.)

		Length.		Diameter.	
		ft.	in.	ft.	in.
(a.)	Topmast - - - -	50	6	-	16
(b.)	Top-gallant and Royal mast - - - -	39	6	-	9
(c.)	Lower yard - - -	71	0	-	17
(d.)	Top-sail yard - - -	51	6	-	11½
(e.)	Top-gallant yard - -	33	0	-	8
(f.)	Royal yard - - -	24	6	-	5

		Length.		Breadth.		Depth.		
		ft.	in.	ft.	in.	ft.	in.	
(g.)	Tops - - -	11	0	18	4	0	4	
(h.)	Lower trestle-trees -	11	1	1	1	1	5½	
(i.)	Lower cross-trees - - {	after	17	9	1	2	0	9
		fore	15	9	1	2	0	9
(k.)	Lower caps - - -	5	6	2	9	1	1	
(l.)	Topmast trestle-trees -	4	3	0	4	0	6½	
(m.)	Topmast cross-trees - - {	after	12	3	0	4½	0	3½
		fore	9	9	0	4½	0	3½
(n.)	Topmast caps - - -	2	11	1	6	0	7	

31. Eleventh class.

(For the mainmast of frigates 8th class and of corvettes 1st class.)

		Length.		Diameter.	
		ft.	in.	ft.	in.
(a.)	Topmast - - - -	48	4	-	15
(b.)	Top-gallant and Royal mast - - - -	37	6	-	9
(c.)	Lower yard - - -	67	6	-	16
(d.)	Top-sail yard - - -	49	0	-	11
(e.)	Top-gallant yard - -	32	0	-	8
(f.)	Royal yard - - -	23	6	-	5

			Length.		Breadth.		Depth.	
			ft.	in.	ft.	in.	ft.	in.
(g.)	Tops	- - -	10	6	17	6	0	4
(h.)	Lower trestle-trees	-	10	5	1	0 $\frac{1}{2}$	1	5 $\frac{1}{2}$
(i.)	Lower cross-trees	{ after	17	0	1	2	0	9
		{ fore	15	3	1	2	0	9
(k.)	Lower caps	- - -	5	2	2	8	1	1
(l.)	Topmast trestle-trees	-	4	0	0	4	-	6 $\frac{1}{2}$
(m.)	Topmast cross-trees	{ after	12	2	0	4 $\frac{1}{2}$	0	3 $\frac{1}{2}$
		{ fore	9	6	0	4 $\frac{1}{2}$	0	3 $\frac{1}{2}$
(n.)	Topmast caps	- - -	2	9	1	5	0	6

32. Twelfth class.

(For the mainmast of frigates 9th class, corvettes 2nd class, and brigs 1st class.)

			Length.		Diameter.	
			ft.	in.	in.	
(a.)	Topmast	- - -	46	6	-	14 $\frac{1}{2}$
(b.)	Top-gallant and Royal mast	- - -	36	0	-	8 $\frac{1}{2}$
(c.)	Lower yard	- - -	64	0	-	15 $\frac{1}{2}$
(d.)	Topsail yard	- - -	47	0	-	10 $\frac{1}{2}$
(e.)	Top-gallant yard	- - -	31	0	-	7 $\frac{1}{2}$
(f.)	Royal yard	- - -	23	0	-	4 $\frac{1}{2}$

			Length.		Breadth.		Depth.	
			ft.	in.	ft.	in.	ft.	in.
(g.)	Tops	- - -	10	0	16	9	0	4
(h.)	Lower trestle-trees	-	10	0	1	0 $\frac{1}{2}$	1	5 $\frac{1}{4}$
(i.)	Lower cross-trees	{ after	16	3	1	1 $\frac{1}{2}$	0	8 $\frac{3}{4}$
		{ fore	14	8	1	1 $\frac{1}{2}$	0	8 $\frac{3}{4}$
(k.)	Lower caps	- - -	4	10	2	6	1	1
(l.)	Topmast trestle-trees	-	3	10	0	4	0	6 $\frac{1}{2}$
(m.)	Topmast cross-trees	{ after	11	9	0	4 $\frac{1}{2}$	0	3 $\frac{1}{2}$
		{ fore	9	1	0	4 $\frac{1}{2}$	0	3 $\frac{1}{2}$
(n.)	Topmast caps	- - -	2	6	1	4 $\frac{1}{2}$	0	5 $\frac{1}{2}$

33. Thirteenth class.

(For the mainmast of frigates 10th class, corvettes 3rd class, and brigs 2nd class.)

			Length.		Diameter.	
			ft.	in.	in.	
(a.)	Topmast	- - -	44	6	-	14
(b.)	Top-gallant and Royal mast	- - -	35	0	-	8
(c.)	Lower yard	- - -	61	0	-	14 $\frac{1}{2}$
(d.)	Topsail yard	- - -	45	0	-	10
(e.)	Top-gallant yard	- - -	29	6	-	7 $\frac{1}{2}$
(f.)	Royal yard	- - -	22	0	-	4 $\frac{1}{2}$

		Length.		Breadth.		Depth.	
		ft.	in.	ft.	in.	ft.	in.
(g.)	Tops - - -	9	6	16	0	0	4
(h.)	Lower trestle-trees -	9	8	1	0	1	5
(i.)	Lower cross-trees - {	after	15	8	1	1½	0
		fore	14	0	1	1½	0
(k.)	Lower caps - - -	4	9	2	4	1	1
(l.)	Topmast trestle-trees	3	8	0	3½	0	6½
(m.)	Topmast cross-trees - {	after	11	5	0	4	0
		fore	8	10	0	4	0
(n.)	Topmast caps - - -	2	6	1	4	0	5

34. Fourteenth class.

(For the mainmast of brigs 3rd class.)

		Length.		Diameter.	
		ft.	in.	ft.	in.
(a.)	Topmast - - -	42	6	-	13½
(b.)	Top-gallant and Royal mast - - -	33	6	-	8
(c.)	Lower yard - - -	58	0	-	13½
(d.)	Top-sail yard - - -	43	0	-	9½
(e.)	Top-gallant yard - - -	28	6	-	7
(f.)	Royal yard - - -	21	0	-	4½

		Length.		Breadth.		Depth.	
		ft.	in.	ft.	in.	ft.	in.
(g.)	Tops - - -	9	4	15	4	0	4
(h.)	Lower trestle-trees -	9	2	0	11	1	5
(i.)	Lower cross-trees - {	after	15	0	1	1½	0
		fore	13	3	1	1½	0
(k.)	Lower caps - - -	4	6	2	4	1	0
(l.)	Topmast trestle-trees -	3	7	0	5½	0	6
(m.)	Topmast cross-trees - {	after	10	10	0	4	0
		fore	8	6	0	4	0
(n.)	Topmast caps - - -	2	5	1	4	0	5

35. Fifteenth class.

(For the mainmast of brigs 4th class.)

		Length.		Diameter.	
		ft.	in.	ft.	in.
(a.)	Topmast - - -	41	0	12½	
(b.)	Top-gallant and Royal mast - - -	32	6	7½	
(c.)	Lower yard - - -	55	0	13	
(d.)	Top-sail yard - - -	41	0	9	
(e.)	Top-gallant yard - - -	27	0	6½	
(f.)	Royal yard - - -	20	6	4	

			Length.		Breadth.		Depth.	
			ft.	in.	ft.	in.	ft.	in.
(g.)	Tops	- - -	8	8	14	8	0	4
(h.)	Lower trestle-trees	- - -	8	9	0	10 $\frac{3}{4}$	1	4 $\frac{1}{2}$
(i.)	Lower cross-trees.	after	14	4	1	1 $\frac{1}{2}$	0	7 $\frac{3}{4}$
		fore	12	10	1	1 $\frac{1}{2}$	0	7 $\frac{3}{4}$
(k.)	Lower caps	- - -	4	2	2	2	0	9
(l.)	Topmast trestle-trees	- - -	3	5	0	3 $\frac{1}{2}$	0	6
(m.)	Topmast cross-trees	after	10	6	0	4	0	3
		fore	8	2	0	4	0	3
(n.)	Topmast caps	- - -	2	5	1	4	0	5

36. Sixteenth class.

(For the foremast of corvettes.)

				Length.		Diameter.	
				ft.	in.	ft.	in.
(a.)	Topmast	- - -	-	39	6	-	12
(b.)	Top-gallant and Royal mast	- - -	-	31	0	-	7
		- - -	-	52	6	-	12 $\frac{1}{2}$
(c.)	Lower yard	- - -	-	39	0	-	8 $\frac{1}{2}$
(d.)	Topsail yard	- - -	-	26	0	-	6 $\frac{1}{2}$
(e.)	Top-gallant yard	- - -	-	19	6	-	4

				Length.		Breadth.		Depth.	
				ft.	in.	ft.	in.	ft.	in.
(g.)	Tops	- - -	-	8	6	14	0	0	4
(h.)	Lower trestle-trees	- - -	-	8	6	0	10 $\frac{3}{4}$	1	4 $\frac{1}{2}$
(i.)	Lower cross-trees	after	13	9	1	1 $\frac{1}{2}$	0	7 $\frac{3}{4}$	
		fore	12	5	1	1 $\frac{1}{2}$	0	7 $\frac{3}{4}$	
(k.)	Lower caps	- - -	-	4	1	2	1	0	9
(l.)	Topmast trestle-trees	- - -	-	3	4	0	3 $\frac{1}{2}$	0	6
(m.)	Topmast cross-trees	after	10	1	0	4	0	3	
		fore	8	0	0	4	0	3	
(n.)	Topmast caps	- - -	-	2	4	1	3 $\frac{1}{2}$	0	5

37. Seventeenth class.

(For the mizenmast of frigates.)

				Length.		Diameter.	
				ft.	in.	ft.	in.
(a.)	Topmast	- - -	-	37	6	-	11 $\frac{1}{2}$
(b.)	Top-gallant and Royal mast	- - -	-	30	0	-	7
		- - -	-	50	0	-	12
(c.)	Lower yard	- - -	-	37	6	-	8
(d.)	Topsail yard	- - -	-	25	0	-	6
(e.)	Top-gallant yard	- - -	-	19	0	-	4

TOPMASTS AND YARDS.

			Length ft	in
(g.)	Tops	-	8	2
(h.)	Lower trestle-trees	-	8	1
(i.)	Lower cross-trees	{ after	13	3
		{ fore	11	11
(l.)	Lower caps	-	3	11
(h.)	Topmast trestle-trees	-	3	3
(m.)	Topmast cross-trees	{ after	9	0
		{ fore	7	8
(n.)	Topmast caps	-	2	3

38. Eighteenth class.

(For the mizenmast of frigates and

(a.)	Topmast	-	-	-
(b.)	Top-gallant and mast	-	-	Royal
(c.)	Lower yard	-	-	-
(d.)	Topsail yard	-	-	-
(e.)	Top-gallant yard	-	-	-
(f.)	Royal yard	-	-	-

			Length ft	in
(g.)	Tops	-	7	1
(h.)	Lower trestle-trees	-	7	
(i.)	Lower cross-trees	{ after	12	1
		{ fore	11	
(l.)	Lower caps	-	3	
(h.)	Topmast trestle-trees	-	3	
(m.)	Topmast cross-trees	{ after	9	
		{ fore	7	
(n.)	Topmast caps	-	2	

39. Nineteenth class.

(For the mizenmast of frigates and

(a.)	Topmast	-	-	-
(b.)	Top-gallant and mast	-	-	Royal
(c.)	Lower yard	-	-	-
(d.)	Topsail yard	-	-	-
(e.)	Top-gallant yard	-	-	-
(f.)	Royal yard	-	-	-

Breadth.		Depth.	
ft.	in.	ft.	in.
13	6	0	4
0	10½	1	4½
1	1½	0	7½
1	1½	0	7½
2	0	0	9
0	3½	0	5½
0	4	0	3
0	4	0	3
1	3	0	3

(corvettes.)

Length.		Diameter.	
ft.	in.	ft.	in.
36	0	-	11
29	0	-	6½
47	6	-	11½
36	0	-	8
24	0	-	6
18	0	-	3½

th.	Breadth.		Depth.	
	ft.	in.	ft.	in.
0	12	10	0	4
9	0	10½	1	4½
0	1	1½	0	7½
4	1	1½	0	7½
8	2	0	0	9
0	0	3	0	5
2	0	4	0	3
2	0	4	0	3
1	1	1	0	4½

(corvettes.)

Length.		Diameter.	
ft.	in.	ft.	in.
34	6	-	10½
28	0	-	6½
45	0	-	10½
34	0	-	7½
23	0	-	5½
17	6	-	3½

			Length.		Breadth.		Depth.	
			ft.	in.	ft.	in.	ft.	in.
(g.)	Tops	- - -	7	6	12	6	0	4
(h.)	Lower trestle-trees	- - -	7	6	0	10 $\frac{3}{4}$	1	4 $\frac{1}{2}$
(i.)	Lower cross-trees	- {after	12	2	1	1 $\frac{1}{2}$	0	7 $\frac{3}{4}$
		- {fore	11	0	1	1 $\frac{1}{2}$	0	7 $\frac{3}{4}$
(k.)	Lower caps	- - -	3	7	1	10	0	7 $\frac{1}{2}$
(l.)	Topmast trestle trees	- - -	3	0	0	3	0	5
(m.)	Topmast cross-trees	- {after	9	2	0	4	0	3
		- {fore	7	2	0	4	0	3
(n.)	Topmast caps	- - -	2	1	1	1	0	4 $\frac{1}{2}$

40. Twentieth class.

(For the mizenmast of frigates and corvettes.)

			Length.		Diameter.	
			ft.	in.	ft.	in.
(a.)	Topmast	- - -	33	0	-	10
(b.)	Top-gallant and Royal mast	- - -	27	0	-	6
(c.)	Lower yard	- - -	43	0	-	10
(d.)	Topsail yard	- - -	33	0	-	7
(e.)	Top-gallant yard	- - -	22	0	-	5 $\frac{1}{2}$
(f.)	Royal yard	- - -	17	0	-	3 $\frac{1}{2}$

			Length.		Breadth.		Depth.	
			ft.	in.	ft.	in.	ft.	in.
(g.)	Tops	- - -	7	0	12	0	0	4
(h.)	Lower trestle-trees	- - -	7	0	0	10 $\frac{3}{4}$	1	4 $\frac{1}{2}$
(i.)	Lower cross-trees	- {after	11	8	1	1 $\frac{1}{2}$	0	7 $\frac{3}{4}$
		- {fore	10	6	1	1 $\frac{1}{2}$	0	7 $\frac{3}{4}$
(k.)	Lower caps	- - -	3	5	1	9	0	7
(l.)	Topmast trestle-trees	- - -	3	0	0	3	0	5
(m.)	Topmast cross-trees	- {after	9	2	0	4	0	3
		- {fore	7	2	0	4	0	3
(n.)	Topmast caps	- - -	2	1	1	1	0	4 $\frac{1}{2}$

DIVISION C.**PLANS FOR STEPPING LOWER MASTS.****201.** Step for the heel for the foremast of a 74-gun ship on the old plan (on a $\frac{1}{2}$ in. scale).**202.** Iron main step for a 74-gun ship's mast (on a $\frac{1}{2}$ in. scale).
Proposed by Mr. Blake.**203.** Main step for a 74-gun ship (on a $\frac{1}{2}$ in. scale).**204.** Lower part of bow, showing a step for a foremast.
Proposed by Mr. Blake. 1826.

205. Plan for raising the lower masts of ships in ordinary out of their step, and lodging the heel of the same on pigs of iron ballast, by which means a free current of air is allowed to pass round them.

Proposed by Sir R. Seppings. 1832.

206. Part of lower mast, stepped on lower or middle deck (fished with iron fishes for heaving down), so as to enable shorter lower masts to be used for large ships.

Proposed by Mr. J. Jeffery, Master, R.N. 1852.

207. Two Models (A. and B.) (on a $\frac{1}{4}$ in scale), showing the arrangement of the heel piece of the mainmast of a screw-steamer, to enable the screw shaft to pass through. Ordered to be adopted in H.M.S. "DUKE OF WELLINGTON," at Portsmouth, in 1852, H.M.S. "EURYALUS," at Chatham, in 1852, and other ships when suitable.

208. Model (on a $\frac{1}{4}$ in. scale), showing the arrangement for the shaft alley, and the step for the mast, as proposed for H.M.S. "ALEX," fitted at Devonport in 1856, and ordered to be adopted for all vessels of her class.

DIVISION D.

PLANS FOR RAISING, LOWERING, AND FIDDING TOPMASTS, TOPGALLANT MASTS, &c.

231. Plan for lowering topmast, by means of a screw under the heel.

232. Plan for raising topmast by screws under the fd.
By Sir Robert Seppings.

233. Plan for raising topmast, by means of a lever and rack each side of the mast.

234. Lower part of a topgallant mast, with double wedge fd, fitted on a plan of Sir Robert Seppings; and the heel of a topgallant mast of a 74-gun ship, (on a 3-in. scale), fitted on the same principle.

235. Upper part of lower mast, with topmast, showing an unusual length of heel with a five sheave below the fd.

236. Plan for lowering topmast, by means of a rack and toggle at the fore part of the topmast.

By Captain Morgan, R.N.

237. Plan for relieving the fids of topmasts by swivel fid plates, in order that they may be struck with facility without slacking the lanyards (on an inch scale).

Proposed by Mr. John P. Wallis, Foreman of H.M. Yard, Plymouth.

238. Masthead and topmast, showing a plan for guiding the fid.

239. Plan for assisting the fidding and unfidding the topmasts of line-of-battle ships by means of a chain secured to the cap and passing through the topmast.

By Captain Boxer, R.N.

240. Plan for striking topmasts, by means of a toggle on each side; being very similar to Rotch's lever fid.

241. Plan for raising topmasts, with a lever in the fore part, to relieve the common fid.

By Mr. Batts.

242. Plan for striking topmast, by a lever on each side. Proposed by Lieutenant Horatio J. Austin, R.N., Gillingham, Chatham.

243. Topmast with a wedge fid in three pieces.

244. Lower part of topmast, with rollers at the heel in lieu of sheave hole.

245. Two topgallant mast wedge fids (on a 2-in. scale).

By Sir Robert Seppings.

246. Lower part of topmast, fitted with lever fid on the trestle trees on the foreside of topmast.

247. Lower part of topmast, with lever fid.

248. Topmast, with ratchet for fid.

249. Topmast, with side runners for the cap to travel up and down.

250. Masthead, with topmast stepped on an inclined cheek, to obviate the necessity of a common fid.

Proposed by Mr. Thomas Roberts, Pater Yard, in 1802; claimed also by Mr. Smart, and known in the French service 1799.

251. Masthead and lower part of topmast fitted with lever fids for striking topmasts.

By Mr. Rotch, about 1823.

252. Lever fid applied to topgallant mast.

By Mr. Rotch, about 1823.

253. Rack and screw intended to assist the top tackle in the operation of taking out or putting in the common topmast fids, without slacking the rigging.

By Mr. J. Peake, Woolwich Yard. 1824.

254. Heel of a topmast, with fids. 1823.

255. Key fid, for facilitating striking topmasts and setting up the top shrouds.

By Mr. W. M. Rice, Chatham Yard. 1823.

256. Plan of roller fids for topmasts.

By Commander Belcher, R.N. 1823.

257. Plan for striking topmasts by double purchase with sheaves in mast cap.

Proposed by Mr. J. P. Wallis, Foreman, Plymouth Yard. 1842.

258. Plan for striking topmast by a pivot, toggle, and side lever. By Mr. R. Blake, Portsmouth Yard. 1842.

259. Plan for lowering topmasts by ratchet and fid: viz., a ratchet plate, made of iron, introduced in the fore part of the heel, and a paul put on the sweep piece of the topmast cross-trees, to save topmasts coming down when the mast rope is carried away.

Proposed by Captain Wise, R.N., Superintendent of Sheerness Dockyard. Tried first in the "QUEEN," and ordered to be adopted generally by Admiralty Order of 11th June 1861.

260. MODEL of two topgallant masts (A. and B.) A, the one without the head of the topmast, represents the masts with holes cut in them, for fidding, as was then the practice.

B shows an iron ratchet plate, introduced on the fore part of the heel, and an iron paul put on the sweep piece of the topmast cross-trees, to save the masts coming down when the mast rope is carried away.

Proposed by Captain Wise, R.N., 1861, and generally adopted since.

261. Working MODEL, showing a plan to make the tops of the "ROYAL ALFRED," and ships of her class, so as to enable the topmast to be struck with the lower yard in place. This plan also allows the topmast to be struck when its length is great or when the topmast and topgallant mast are in one length.

By the Officers of Portsmouth Yard. 1863.

262. Heel of topmast, lowered by ratchet and fid. 1863.

263. Working MODEL, (on a $\frac{1}{2}$ -in. scale), of an iron lower mast, topmast, &c., with two sections of mast, showing a plan for lowering the topmast within the lower mast.

By the Officers of Portsmouth Yard. 1864.

- 264.** Plan for striking topmasts by double ratchet and purchase.
By Admiral T. M. C. Symonds, R.N. 1864.

DIVISION E.

PLANS FOR MAKING, STRENGTHENING, AND FITTING LOWER MASTS.

- 291.** MODEL of a hollow mast, dovetailed together and hooped.

- 292.** Hoops for mast.

- 293.** First-rate's mainmast on the common principle for inspection, showing, (a) the spindle, (b) side trees, (c) fishes, and (d) cheeks.

- 294.** Lower mast, with cheeks on the common principle.

- 295.** Lower mast, with arris pieces, to make good the side trees and fishes.

- 296.** 74-gun ship's mainmast, with fish on the fore part of the mast (on a $\frac{3}{4}$ -in. scale).

- 297.** Two lower masts, made with six pieces round a centre piece, and cheeks in two pieces.

- 298.** First rate's lower mast, on the common principle (on a $\frac{3}{4}$ -in. scale).

- 299.** Lower mast, made with round pieces in the middle, and four half-circle angle pieces.

- 300.** Lower mast, made of timber on the top and butt method, when it cannot be made of a single stick, with cheeks.

- 301.** Lower mast, made with round pieces.

- 302.** Lower mast, made of a number of pieces keyed together, and filling pieces over the keys to make good the diameter.

- 303.** Lower mast of the "LOIRE," with rubbing paunch on the fore side (on an inch scale).

- 304.** Flush lower mast.

By Mr. W. Chapman, Woolwich Yard.

- 305.** 74-gun ship's mainmast, on the old plan (on a $\frac{1}{2}$ -in. scale).

- 306.** 74-gun ship's mainmast, as proposed (on a $\frac{1}{4}$ -in. scale).
- 307.** Lower mast, put together with tabling pieces, one into the other, on the old plan.
- 308.** Lower mast, in a number of pieces tabled together, also showing tabling for rubbing piece.
- 309.** Lower mast on the old plan, with fish on the fore side.
- 310.** Lower mast, with head and heel alike, and rubbing pieces on the sides.
- 311.** Three plans for making masts.
- 312.** Piece of a single stick lower mast.
- 313.** Part of lower mast, with fishes on the aft part.
- 314.** Part of an 84-gun ship's mainmast, with metal plate let in (on a $\frac{1}{4}$ -in. scale).
- 315.** Part of a lower mast, put together on the plan of tabling.
- 316.** Section of part of a mast, put together in a number of pieces, drilled together with iron crossbars.
- 317.** Four MODELS of mast heads, fitted with rubbing-paunches.
- 318.** Middle of a mast, with rubbing pieces.
- 319.** Sections of metal tubes, for hollow masts.
- 320.** Lower mast on the old plan. About 1812.
- 321.** 46-gun frigate's mast made for inspection, out of a number of square pieces of balk timber, the heads and heel being alike (on an inch scale). By Sir R. Seppings. 1824.
- 322.** Mainmast of a 74-gun ship (on a $\frac{1}{4}$ -in. scale).
By Sir R. Seppings. 1824.
- 323.** Mainmast of a 74-gun ship, on a principle introduced by Sir R. Seppings.
- 324.** Lower mast, on Sir R. Seppings's plan showing the tabling.
- 325.** Lower mast. By Sir R. Seppings. 1829.
- 326.** Lower mast, made of a number of pieces fastened with through bolts, head and heel alike.
By Sir R. Seppings. 1829.
- 327.** Original single stick mast.
By Mr. J. Edey. 1830.

- 328.** Lower mast of the "MELVILLE," with side fishes sent from the East Indies by Sir John Gore. 1834.
- 329.** Two hoops for masts. By Mr. Gibbon. 1836.
- 330.** Plan for making a hollow mast, with joints tailed together, and sections of same. By Mr. J. Allen. 1836.
- 331.** Single stick mast, with a deficiency of size at the head, fitted with oak cheeks to compensate for the same, or to be applied to such sticks as may be reduced in size from a defect or from knots. By Mr. J. Edye. 1839.
- 332.** Single stick mast, with oak cheeks to the hounds. By Mr. J. Edye. 1839.
- 333.** Two plans for lower masts. (A.) shows the spindle in two pieces; (B.) the spindle in two pieces and cheeks in two pieces each, whereby a saving of timber and expense is effected. By Mr. J. Edye.
- 334.** Lower mast, made with a number of pieces (on a $\frac{3}{4}$ -in. scale). By Mr. J. Edye.
- 335.** Lower mast, made in four pieces, with angle iron between the joints. By Mr. McGavin. 1840.
- 336.** 120-gun ship's mainmast, ordered to be conformed to in building masts at Plymouth Yard, by Admiralty Order of 8th April 1839 (on a $\frac{3}{4}$ -in. scale).
(To be compared with the next model.)
- 337.** 120-gun ship's mainmast, showing increased dimensions from the partners to the cap, and comprising a new arrangement of the several parts (on a $\frac{3}{4}$ -in. scale).
Proposed by Mr. J. P. Wallis, Foreman, Plymouth Yard. 1842.
(To be compared with the last model.)
- 338.** Lower mast of H.M.S. "PRIQUE," with additional fishes, secured by iron hoops, showing the plan adopted by Captain Stopford for fishing and repairing it in 1845, when it was found defective.
- 339.** Ferguson's improved patent mast (2). 1859.
- 340.** Upper part of lower mast, showing the mode of construction proposed by Messrs. Samuda for iron masts of "RESISTANCE" and "DEFENCE." 1861.
- 341.** Two MODELS (A. and B.) of plans for the heel of the mainmast for the "PRINCE CONSORT" and "OCEAN," showing the disposition of the plates and butts:—(A.) the plan originally proposed, (B.) an improved arrangement (on an inch scale). By Mr. Charles Pattison. 1862.

DIVISION F.

PLANS FOR MAKING, STRENGTHENING, AND
FITTING TOPMASTS, TOPGALLANT MASTS, &c.

371. Fore topmast.
 372. Lower part of topmast.
 373. Heel of topmast.
 374. Plan for lengthening the heel of a topmast.
 375. Topmast on the old plan.
 376. Four topmasts on the common plan.
 377. Topmast, showing a plan for lengthening the lower part by scarphing.
 378. Topgallant and royal mast on the old plan.
 379. Lower part of topmast, showing a plan for lengthening the same by a double scarph with coaks.
 By Mr. Blake.
 380. Plan for lengthening topmast. By Mr. J. Edye.
 381. Lower part of a topmast for line-of-battle ships.
 1815.
 382. Plan for increasing the length of topmast.
 By Sir R. Seppings. 1817.
 383. Plan for lengthening topmast.
 By Sir R. Seppings. 1831.
 384. Plan for repairing topmast below the cap.
 By Sir R. Seppings. 1831.
 385. Topmast made of four pieces with iron between each joint.
 By Mr. McGavin. 1810.
 386. Lower part of a topmast.
 Roberts's patent. 1843.
 387. Model of a main topgallant mast, 3rd class, three decks, showing the manner in which masts are often altered by the ship's crew after being issued from the dockyard. The sheave hole for the mast rope is filled in, a new sheave hole cut at the heel below the fid, a hole bored above the cap for a temporary fid, and another in the royal pole for a lizard. 1860.

DIVISION G.

PLANS FOR MAKING, STRENGTHENING, AND
FITTING BOWSPRITS.

- 421.** Bowsprit on the common plan.
- 422.** Two bowsprits made in two pieces.
- 423.** Bowsprit composed of seven pieces.
- 424.** Middle part of bowsprit, for 38-gun ships, showing fishes for gammoning (on a $\frac{1}{2}$ -in. scale).
- 425.** Plan for hauling out and taking in the bowsprit, on a series of rollers.
- 426.** Proposed mode of fitting heels of bowsprits to H.M. gun-boats "JASEUR" and "JASPER."
Proposed by Mr. Chatfield, Master Shipwright, Deptford Yard. 1857.
- 427.** Plan for securing bowsprit caps.
Proposed by Mr. W. H. Whottem, Acting Inspector, Portsmouth. 1860.

DIVISION H.

PLANS FOR MAKING, STRENGTHENING, AND
FITTING GAFFS AND BOOMS.

DIVISION I.

PLANS FOR MAKING, STRENGTHENING, AND
FITTING YARDS.

- 451.** Part of a lower yard, in four pieces.
- 452.** Third-class main and topsail yard (on an inch scale).
- 453.** Main yard in two pieces, the joints strengthened with fishes and hoops.
- 454.** Lower yard on the common principle.
- 455.** Two MODELS of a 120-gun ship's main yard, one being lengthened at each end by a scarph.
- 456.** Lower yard in three pieces (a, b, and c).

457. First-rate's main yard (on a $\frac{1}{2}$ -in. scale).

Roberts's patent.

458. Three yards lengthened at each end by a scarp.

459. Yard, put together in two pieces, the joints strengthened with fishes and hoops.

460. Two yards, with fishes brought on to strengthen the middle.

461. 120-gun ship's fore yard (on an inch scale).

462. Part of a made yard.

463. Method of repairing a yard when broken in the slings (on an inch scale).

464. Middle part of a lower yard for line-of-battle ships, on the old plan.

465. Yard, shewing Mr. Blake's proposition for lengthening the yards of line-of-battle ships.

466. Temporary lower yard, fished with studding sail boom, capstan bars, and topmast cross-tree.

By Mr. Gibbon.

467. Topsail yard, fitted with sling and rolling chocks.

468. Middle of a yard, with sling as fitted in the "JASEUR" and "HARRIER."

By Mr. Haydon, Master, R.N.

469. Topsail yard, fitted with rolling chock and hemp parallel.

470. Temporary yard, as proposed to be made with small spars.

By Lieut. Fitzgerald, R.N.

471. Method of repairing yard with iron plates when broken in the slings.

472. Two pattern hoops for yard arm.

473. Series of spars for making yards.

474. Middle part of a lower yard with hoop for sling.

475. Temporary yard, made on board the "CANOPUS" when at sea.

By Mr. Hoskins, Carpenter. 1803.

476. 74-gun ship's fore topsail yard in two pieces, with oak fish.

Plymouth Yard. 1810.

477. Middle of a topsail yard, from Chatham Yard, shewing the fittings. 1823.

478. Middle of a topsail yard, from Deptford Yard. 1823.

479. Yard made in three pieces, scarphed together.

By Lieut. Fitzgerald, R.N. 1828.

480. Topsail yard. By Mr. Smart. 1830.

481. Masthead, top, topmast, and topsail yard, the topsail yard being fitted with slight modifications in the slinging gear on a plan of Sir Wm. Symonds. 1836.

482. Middle part of a lower yard, for line-of-battle ships.

Proposed by Mr. R. Blake, Portsmouth Yard. 1836.

483. Middle of a yard made of four pieces, with angle iron plates in the centre of the same.

By Mr. McGavin. 1840.

484. Mast head, showing a plan for suspending the yard by a chain and cleat, as fitted to H.M.S. "WARSPITE."

Proposed by Lord John Hay. 1841.

485. Two plans for making first-rate's main yard.

By Mr. Elliot, Plymouth Yard. 1843.

486. Plans for making third-rate's main yards.

By Mr. Elliot, Portsmouth Yard. 1843.

487. Two fitted topsail yards. 1858.

488. Plan for making yards, with iron connection at middle, by which it was supposed that a considerable saving might be effected. Proposed by Mr. W. H. Brown. 1862.

489. Mast and yard, showing plan for reefing and furling sails from the deck.

Proposed by Mr. F. A. Elliott. 1863.

490. Plan for topping yards.

By Lieutenant G. T. Morrell. 1864.

DIVISION K.

PLANS FOR MASTHEADS, TOPS, CROSS-TREES, TRESTLE-TREES, AND CAPS.

531. Masthead, cap, and plan for gins, substituted for cheek blocks at the topmast head. 1831.

532. Mizentop of H.M.S. "SAPPHIRE," (on an inch scale), as fitted on Mr. Gibbon's plan, according to directions contained in the Commissioners' Memoranda of the 24th Dec. 1830 and 1st Jan. 1831.

533. Maintop of H.M.S. "PANTALOON," fitted with battens on top.

534. MODEL, (on an inch scale), of a top, showing a plan of fitting the top with the cross-piece between the head of the lower mast and the heel of the top mast.

Proposed by Mr. Whettens, Inspector of Shipwrights, Portsmouth Yard, in 1862, and adopted in H.M.S. "ROYAL OAK," "MINOTAUR," and others.

535. Main trestle and cross-trees of a 38-gun ship (on a 1½-in. scale).

536. 38-gun ship's cross and trestle-trees.

537. Three cross-trees.

538. Trestle and cross-trees to lower mast head.

539. Part of a cross and trestle-tree to lower mast head.

540. Improved trestle-tree for 74-gun ship.

By Sir R. Seppings.

541. Topmast cross-trees of H.M.S. "ASIA."

By Mr. Gibbon. 1825.

542. Topmast cross-trees of H.M.S. "SAPPHIRE," as fitted at Portsmouth in 1831, on a plan by Mr. E. Gibbon. First proposed in 1823.

543. Plan for easily fitting cross-trees at sea.

By Mr. E. Gibbon. 1825.

544. Topmast trestle and cross-trees.

By Mr. Henry Chapman, Woolwich Yard. 1830.

545. Methods of shifting cross-trees from trestle-trees; one (a) on the plan of Sir Robert Seppings, the other (b) recommended by Capt. Warren. 1830.

546. Topmast trestle and cross-tree, for 38-gun ship's foremast (on a 1½ in. scale).

547. Proposed improvement of foremast trestle and cross-trees, by which it may be shifted at sea without disturbing the rigging (on a 1½ in. scale).

By Mr. Henry Chapman, Woolwich Yard.

548. Main trestle and cross-trees of H.M.S. "VERNON," on Mr. Henry Chapman's principle (on an inch scale).

549. Topmast cross-trees fitted with two purchase blocks.

550. 74-gun ship's main cap (on an inch scale).

- 551.** 74-gun ship's main lower cap, as fitted in the "GLOUCESTER" at Sheerness (on a $1\frac{1}{4}$ -in. scale).
- 552.** 74-gun ship's lower cap.
- 553.** 74-gun ship's lower cap, with two hoops.
- 554.** Main topmast cap of the "VERNON" (on an inch scale).
- 555.** Main topmast cap of the "SNAKE."
- 556.** Two caps, on the old plan.
- 557.** Lower cap on a small scale.
- 558.** Lower cap of the present time.
- 559.** A series of caps.
- 560.** 80-gun ship's main cap. It is proposed to reduce the length afore and abaft the holes to three-fourths of the thickness of the cap, as described by black lines (on a $1\frac{1}{4}$ -in. scale).
- 561.** Two caps, such as were in use about 1838.

DIVISION L.

PLANS FOR FITTING CHANNELS, SHROUDS, AND STAYS, INCLUDING DEAD EYES, HEARTS, AND THIMBLES.

- 591.** Part of a solid check channel, with two dead eyes.
- 592.** Part of a channel, showing a plan for securing chain and preventer plate, with a double-eye chain bolt.
- 593.** Plan for securing channel to ship's side, with hooks and eyes inside of channel and iron knee.
- 594.** Plan of check channel made with fore and aft planking, as fitted to the "TERROR," with a preventer plate on the old plan.
- 595.** Solid check channel, rounded in front, showing a plan for securing dead eyes. By Sir W. Symonds.
- 596.** Solid channel, with dead eyes fastened to it. By Capt. Couch.
- 597.** Sheer hulk's channel, showing the mode of setting up chain shrouds (on an inch scale).

598. Single dead eyes and chain with shifting link.

599. Part of a 74-gun ship's main channel, &c, with the dead eyes as usually fitted; also a proposed plan for fitting the same by means of a thimble or preventive bolt, for keeping the dead eyes in their places, in the event of a ship or vessel carrying away her masts (2).

By Mr. J. Weekes, Assistant to the Master Shipwright, Chatham Dockyard. 1826.

600. Plan for securing channels and dead eyes with iron knees only, above and below the channels, instead of chains.

By Mr. J. W. Clarke, Bridwell, Collumpton.

601. Plan for fitting channels and dead eyes inside of ships at height of the upper port sill.

Proposed by Mr. W. Edye, Assistant Master Shipwright, Portsmouth Yard. 1832.

602. Part of a channel, showing a plan for doing away with dead eyes on the channel by means of a dumb shive; also a plan for raising the ports.

603. Main channel, fitted with knees, as at present fitted.

Proposed by Mr. J. Edye.

604. Channel, and a proposed plan for fitting dead eyes, with a section of the dead eye on a large scale.

605. Channel, showing a plan for accommodation seats in the fore chains (on a 4-in. scale).

Proposed by the Officers of Portsmouth Yard, and adopted in H.M.S. "SHANNON." 1861.

606. Single dead eye.

607. Single dead eye and chain plate.

608. Two preventer plates to dead eye chains and bolts; one as fitted to the "RACKER," 16 guns, and the other as fitted to the "CLIO." 1833.

609. Plan for fitting the chain and preventer plates so that a mast, if shot away, may clear itself from the ship.

Proposed by Mr. J. Fuller, Timber Converter, Deptford. 1860.

610. Plan for securing shrouds with eye bolts, without dead eyes.

611. Pattern, showing a plan for securing the futtock shrouds to the mast.

From Mr. Kyd, Calcutta.

612. Clasp hoop with eye for futtock shrouds.

613. Frigate's mainmast, showing a plan for setting up shrouds by a screw and lever.

614. Masthead, showing a new plan for fitting upper part of shrouds.

615. Iron rack frame, with lever, showing a plan for setting up shrouds, as adopted in the French Navy.

(Painchant.)

616. Sister block, with shrouds and dead eyes.

617. Upper part of a 74-gun ship's mainmast, fitted with chain shrouds as a preventive in the event of the hemp shrouds being shot away.

618. Section of a 74-gun ship and main channel, showing a plan for securing shrouds to ship's side.

By Mr. Richard Blake, Foreman of Woolwich Yard, 1806.

619. Plan for fitting shrouds with metal dead eyes, and for setting up the same.

620. Mast and part of channel, showing a plan for setting up the shrouds, with screw and plates.

By Lieut. Rigmaiden. 1851.

621. Two plans for setting up rigging.

By Lieut. Rigmaiden, as fitted to the "SOUTHAMPTON" and H.M.S. "PHAETON." 1851.

622. Pattern, showing proposed modification of Rigmaiden's plates for setting up shrouds.

Deptford Yard. 1858.

623. Pattern, showing a plan for setting up rigging by lever, nut, and screw. 1852.

624. Two MODELS, showing a plan of fitting chain and preventer plate.

625. Plan for easing off stays of small vessels by means of a spiral metal spring.

626. Bow, with hearts through the two foremost ports for setting up the stays.

By Sir W. Symonds.

627. Metal heart for a mainstay.

By Mr. R. Blake. 1826.

628. Two plans (A. and B.) of securing and letting go wire bob-stays.

By Mr. L. Read, Master Shipwright, Sheerness. 1858.

629. Iron stay protector, to admit of wire stays being placed near or close over the funnel.

Proposed by Mr. Gahan, Master, H.M.S. "MARS." 1859.

- 630.** Pattern of sliding jack stays.
Proposed by Mr. G. L. Stocks. 1861.
- 631.** Iron heart-shaped thimble, to be used in place of the heart. 1831.
- 632.** Improved semi-circular grooved thimble.
By Mr. Andrew Smith. 1845.
- 633.** Improved semi-circular grooved thimble and wire stop of galvanized iron.
By Mr. Andrew Smith.
- 634.** Block of patent mineralized red rubber, sent for experimental purposes by Messrs. Warne & Co. in 1858, who state that it may be moulded into any form suitable for giving elasticity to ships' shrouds.
- 635.** Plan for dead eyes.
By Mr. W. Rees, Master Rigger, Sheerness. 1864.

DIVISION M.

BLOCKS AND SHEAVES.

- 661.** Common single block.
- 662.** (a) One common block, with hemp stop; (b) one with iron sheave, and seasoned wire stop, by Mr. Andrew Smith; (c) one iron bound.
- 663.** Two cheek blocks.
- 664.** Leach of a sail, with block and shackle.
By Capt. Shiffner.
- 665.** Arnett and Co.'s patent roller sheave.
- 666.** Pattern clew for a mainsail.
- 667.** Two stone sheaves, and one block with same.
- 668.** Two strapbored blocks. 1831.
- 669.** Bound block, with two side hooks.
- 670.** Two common unfinished blocks.
- 671.** Clews of main course for three-decked ships, with tack and sheet blocks connected thereto by shackle, as proposed by Mr. C. Brown, Master Attendant, Devonport. 1849. Approved of by the Committee at Devonport, and in general use.

672. Three-fold block.

673. Jonas's self-controlling sheest block, fitted for trial on board H.M.S. "Rolla." 1858.

674. Patent vitrified sheave for blocks, in lieu of lignum vite.

By Mr. W. McAdam, Hyde Park Works, Glasgow.
1862.

675. Iron swivel block.

By Mr. Henry Redaull, Deal. 1853.

DIVISION N.

SPECIMENS OF ROPE, &c. FOR RIGGING, &c.

701. Specimen of hemp rope.

702. Specimens of hide rope, laid up in oil.

703. Specimens of Messrs. Drayner and Redman's patent cordage.

704. Seven pieces of plaited rope.

705. Specimens of iron wire rope, for standing rigging.

706. Specimens of iron wire rope.

707. Specimens of iron wire rope.

708. Specimens of iron wire rope.

709. Specimens of plaited iron wire rope.

710. Specimens of iron wire rope.

711. Specimens of patent galvanized iron wire rope.

712. Specimens of iron wire rope, served with spunyarn and "Samson" line.

713. Specimens of iron wire rope.

By Messrs. R. Newall and Co.

714. Specimen of belt rope, with canvas tarred and untarred for "parcelling."

715. Specimens of iron wire rope, one with thimble, and the other served.

716. Coil of iron wire rope.

717. Coil of galvanized iron wire.

718. Specimens of galvanized iron wire and rope, with hearts for the same.

719. Specimens of coir, or Indian grass rope.

720. Specimens of cocoa-nut rope.

721. Specimens of Chinese bamboo rope.

722. China flax ("Yucca superba"), saturated for naval purposes.

723. Tarred yarn and oakum, from China hemp.

724. Specimens of Annanus hemp.

725. Specimens of Annanus hemp (undressed).

726. Specimen of New Zealand hemp.

727. Specimens of undressed flax from New Zealand.

728. Specimens of tarred yarn.

729. Rope for hand and deep sea lead.

730. Leaden tube, inclosing wire for submarine telegraph.

731. Strips of hide.

732. Various sized specimens of iron wire rope, with thimbles. Manufactured by Mr. Andrew Smith, Millwall. 1840.

733. Specimens of iron wire rope.

By Mr. Andrew Smith.

734. Three pieces of wire rope and piece of chain for topsail sheet.

By Mr. Andrew Smith.

735. Specimens of copper wire rope, for the "VAN-GUARD'S" lightning conductor.

Approved by the Earl of Minto. 1840.

736. Specimens of the various kinds of rope in use at the present time (1865) in H.M.'s dockyards.

No. 1. For masting ships; cordage, hawser-laid, 3 strands, 8 in.

" 2. Engineers' falls; cordage, hawser-laid, 3 strands, 3 in., for lifting machinery.

" 3. Gun, 110-pounder Armstrong, cordage breeching 9 in.

" 4. Gun, 110-pounder Armstrong, cordage breeching 3 in., for side and traversing tackle.

" 5. 1st class frigate; cordage, hawser-laid, 4 strands, 7½ in., for main-top shrouds.

- No. 6. 1st class frigate; cordage, hawser-laid, 3 strands, 3 in., for lower braces and fish falls.
- " 7. 1st class frigate; cordage, cable-laid, 4 in., for transporting small vessels.
- " 8. 1st class frigate; cordage, boltrope, hawser-laid, 3 strands, 4 in., for foot-rope, mizen topsails.
- " 9. 1st class frigate; cordage, hawser-laid, 3 strands, 4 in., for main topsail braces and lifts.
- " 10. 1st class frigate; coir rope, 4 in., for picking up boats.
- " 11. 1st class frigate; cordage, hawser-laid, 3 strands, 3 in., for main buntlines and leechlines.
- " 12. 1st class frigate; cordage, hawser-laid, 3 strands, $2\frac{1}{2}$ in., for main topgallant, clewlines, and hal-yards.
- " 13. 1st class frigate; cordage, hawser-laid, 3 strands, 2 in., for ear-rings for sails.
- " 14. 1st class frigate; cordage, hawser-laid, 3 strands, $1\frac{1}{2}$ in., for mizen topgallant, buntlines, and bowlines.
- " 15. 1st class frigate; cordage, hawser-laid, 3 strands, 1 in., for seizings for blocks.
- " 16. 1st class frigate; signal halyards, $1\frac{1}{4}$ in.
- " 17. 1st class frigate; hide rope, $4\frac{1}{2}$ in., for steering ship.
- " 18. Wire rope of $7\frac{1}{2}$ in., equal to hempen rope of 15 in., for the lower stays of the largest class ships.
- " 19. Wire rope of $6\frac{1}{2}$ in., equal to hempen rope of 13 in., for the lower rigging of the largest class ships.
- " 20. Wire rope of 6 in., equal to hempen rope of 12 in., for the lower rigging of line-of-battle ships.
- " 21. Wire rope of $5\frac{1}{2}$ in., equal to hempen rope of 11 in., for the lower rigging of first-class frigates.
- " 22. Wire rope of 5 in., equal to hempen rope of 10 in., for the lower rigging of first-class corvettes.

- No. 23. Wire rope of $4\frac{1}{2}$ in., equal to hempen rope of 9 in., for the lower rigging of second-class corvettes.
- „ 24. Wire rope of 4 in., equal to hempen rope of 8 in., for the lower rigging of fourth-class corvettes.
- „ 25. Wire rope of $3\frac{1}{2}$ in., equal to hempen rope of 7 in., for the lower rigging of ships.

DIVISION O.

SPECIMENS OF CANVAS FOR SAILS.

771. Two studding sails.

772. Two specimens, showing a plan adopted in the ship "CARAVAN," for making and fitting sails, whereby it was supposed an advantage would be obtained in durability, lightness, and cost. Proposed by Mr. W. A. Sands 1862.

773. Description of the services for which the various numbers of broad and narrow canvas are used in the service at the present time (1864).

BROAD.

- No. 1. Used in making fore and main courses, fore and main staysails, and mizen try sails for vessels of large size.
- No. 2. Used in making fore and main topsails and main try sails for large vessels; and fore and main courses for small vessels.
- No. 3. Used in making fore and main gaffsails for vessels generally; and fore and main topsails for vessels of medium size.
- No. 4. Used in making 2nd jibs, spankers, and awnings for vessels generally; and jibs for large vessels.
- No. 5. Used in making fore and main topgallant sails, and fore topmast staysails for large vessels.
- No. 6. Used in making flying jibs, mizen topgallant sails, and lower and topmast studding sails for large vessels; and fore topmast staysails for small vessels.
- No. 7. Used in making fore and main royals for vessels generally; flying jibs, lower and topmast studding sails for small vessels, and boat sails.
- No. 8. Used in making mizen royals and topgallant studding sails for small vessels, and boat sails.

NARROW.

- No. 1. Used in making boom mainsails for brigs, and cutters of the largest size.
- No. 2. Used in making boom mainsails and foresails for cutters of small size.
- No. 3. Used in making fore and main gaffsails for vessels generally.
- No. 4. Used in making spankers for all classes of ships; and jibs for large vessels.
- No. 5. Used in making jibs for vessels of medium size.
- No. 6. Used in making flying jibs for vessels of large size; and jibs for vessels of small size.
- No. 7. For flying jibs for small vessels and boatsails.
- No. 8. For flying jibs for smallest class of vessels and boatsails.

774. Main topsail, showing the effect of the wind upon it in a hurricane South of Mauritius, March 21, 1851.

DIVISION P.

MODELS OF MASTS, &c., SHOWING THE DAMAGE SUSTAINED BY THEM IN ENGAGEMENTS WITH THE ENEMY.

801. Mainmast of H.M.S. "GENOA," showing the effect of the shot.

802. Part of mainmast of H.M.S. "GENOA," showing the effect of the shot.

803. Foremast, (on a $\frac{3}{4}$ -in. scale), of H.M.S. "VICTORY," showing the shot holes it received in the battle of Trafalgar 1805; made from a piece of the mast which was in the ship on the day of the action.

804. MODEL, (on a $\frac{1}{4}$ -in. scale), of the same as preceding.

805. The three lower masts of H.M.S. "ASIA," showing the effects of the shot after the battle of Navarino, in 1827.

DIVISION Q.

ALL MODELS IN CONNEXION WITH MASTS AND RIGGING NOT INCLUDED IN THE FOREGOING DIVISIONS.

- 821.** Cutter showing revolving masts and sails.
By Lieut. Shuldham, R.N.
- 822.** Vessel with six masts lightly rigged.
By Mr. Jones, Smith Street, Liverpool.
- 823.** Plan for expeditiously fitting sails on a jury mast.
By Captain J. N. Taylor. 1828.

CLASS XI.

Arrangements for launching Ships, hauling them up, heaving them down, raising them in Floating Docks, &c.

(FOR DRY DOCKS, *see* CLASS XII.)

1. MODEL of the "VICTORY," 100 guns, on a launch (on a $\frac{1}{4}$ -inch scale). (See Class I., Division A., No. 13.)
The launching ways are fitted with four transverse vertical timbers or spurs on each side of the ship forward, and three on each side aft, in addition to the ordinary poppets which were supposed, at the time this ship was built, to ensure greater safety in launching, as also to support the cradle when the weight of the ship was transferred from the blocks, on which she was built, to the ways. These spurs are bolted at their heads just under the main wales and at their heels at the sides of the bilgeways and poppets. The objection to this mode of fitting a launch is that the cradle cannot be got from under the bottom without unbolting these spurs, which was found to be a difficult and dangerous operation to perform while the ship was afloat, and in many cases the ship had to be docked for this purpose.

This was the plan of launching prior to 1763.

2. MODEL of the "DIANA," 38 guns, on a launch (on a $\frac{1}{4}$ -inch scale). (See Class I, Division A., No. 71.)

The launching ways to this ship are fitted in a similar manner to that of the preceding model, but more extensively carried out, having five transverse vertical timbers or spurs forward, and six aft on each side of the ship, being four more on each side than the "VICTORY;" besides which fore and aft planks and cleats are fitted and bolted to the ship's bottom, to support the heads of the poppets; and in order to keep her perfectly steady at the time of launching five quarter shores are placed on each side, and so arranged that immediately the ship begins to move they become disconnected. This plan was in use in 1794, and was supposed to be an improvement upon the preceding model, inasmuch as the increased number of spurs, and the additional quarter shores were considered to add further to the safety of the ship in launching. The same objection, however, applies to this model as to the last, viz. that of not being able to get the cradle from under the ship's bottom while afloat.

3. MODEL of the "ARTOIS," 38 guns, on a launch (on a $\frac{1}{4}$ -inch scale). (See Class I, Division A., No. 72.)

This model represents the mode of launching ships in H.M. Dockyards at the present time, and was adopted subsequent to 1795. The advantage of this over the preceding method is, that the cradle can be got out from under the bottom without docking the ship, immediately after she is launched, leaving only the planks and cleats on the bottom, to be unbolted when the ship goes into dock. The chief difference between this plan and that of the "DIANA" is, that no spurs or quarter shores are used, the poppets being well secured at their heads and heels without spurs, and the two foremost and three aftermost poppets have their heels placed nearer the extremities of the ship, in order that they may stand nearly square to the body, and thus give more support to the structure.

4. Sketch representing the profile and plan of H.M.S. "KENT," with the number of purchases for hauling her on the slip, an operation which was executed in 40 minutes at Plymouth Yard.

(This sketch will be found in Class XVI., No. 10.)

5. MODEL of a two-decked ship, showing the method of heaving down ships at Antigua, under the direction of Commissioner Lewis.

6. MODEL of the "PSYCHE," 32 guns (on a $\frac{1}{8}$ -inch scale). (See Class I., Division A., No. 76.)

This model shows a plan for heaving up ships on the lakes of Upper Canada, by Mr. Moore, Master Shipwright, Kingston, about 1820.

7. MODEL of a frigate, showing a plan for raising sunken vessels by casks, with a floating beacon to denote a sunken ship.

8. Floating dock, from a design by Admiral Schank. 1821.

9. Section of a floating dock.

10. American screw dock; the dock lowered down by means of vertical screws, sufficiently low to float the ship upon it; main purchase being at the fore end of dock to raise the ship.

By Mr. Thomas M. Coffin, Patentee.

11. Russian floating dock or camel, used for floating large vessels over a bar; also a midship section of the same on a larger scale. The dock is lowered by the water passing into it through plug holes, and raised by means of pumps fore and aft.

12. Floating dock and the section of a ship, showing a plan for repairing ships at Spithead.

Proposed by Mr. Warder, late Draughtsman in the office of the Controller of the Navy. 1859.

CLASS XII.

Models of Buildings, Breakwaters, &c.

Divisions.

A.—Dockyards, Admiralty houses, hospitals, &c.	C.—Models of sheers, derricks, cranes, &c.
B.—Dry docks, basins, building sheds, timber sheds, &c.	D.—Breakwaters, &c.
	E.—Semaphores, beacons, buoys, &c.

DIVISION A.

DOCKYARDS, ADMIRALTY HOUSES, HOSPITALS, &c.

1. Two MODELS of the mountain district of the Island of Ascension, showing the extent to which sheep may be suffered to graze. 1840.

2. MODEL of Malta Hospital, the centre part was built by the Knights of St. John as a residence; the wings were added by the Admiralty from the design and under the directions of Mr. Zerri, a Maltese architect.

3. MODEL of H.M. Victualling Establishment at Plymouth, designed by Mr. Taylor, civil architect to the Admiralty, and built by Messrs. Mackintosh, contractors.

DIVISION B.

DRY DOCKS, BASINS, BUILDING SHEDS, TIMBER SHEDS, &c.

(FOR FLOATING DOCKS, *see* CLASS XI.)

20. Temporary shed for seasoning timber.

21. Sliding carriage for raising rough timber into the stowing frame.

22. Shed for stowing rough timber.

23. Plan for erecting drying sheds for seasoning timber.
Proposed by Mr. Hawkes, Master Shipwright, Pembroke Yard.

24. Iron bollard for the sides of docks, &c.
By Mr. Kingston, Portsmouth Yard. 1824.

25. Dock gates.

26. Two MODELS (A. and B.) of the after part of a dock. (A.) shows the plan of laying and securing the blocks and sliding plank formerly in practice; (B.), the plan proposed by Mr. J. Merrall, Leading-man of Shipwrights, Chatham Yard, in 1834.

27. Framework for raising timber, and sliding roof.
Proposed by Sir W. Symonds. 1841.

28. MODEL of entrance lock and sliding caisson, as executed for the lock entrance to the basins at H.M. dockyard, Keyham.

Designed by the Deputy Director of Admiralty Works, Mr. Scamp. The caisson constructed by Messrs. Fairbairn.

29. MODEL for forming a double dock at Malta by a sliding caisson, showing also the details of construction of masonry for the dock.

Designed by the Deputy Director of Admiralty Works, Mr. Scamp. The caisson constructed by Messrs. Fairbairn.

30. MODEL of a design for lifting vessels of about 3,000 tons and laying them up on slips in a sea-going state, with the exception of ordnance stores, coal, water, and victuals, to be ready for sea at short notice.

Designed by the Deputy Director of Admiralty Works,
Mr. Scamp.

DIVISION C.

MODELS OF SHEERS, DERRICKS, CRANES, &c.

- 40.** Jetty, and sheers for masting ships.
 - 41.** Jetty and masting sheers.
 - 42.** Sheer hulk; a floating vessel for masting ships.
 - 43.** Two diving bells.
 - 44.** Tram rail with two carriages to transport ships' masts.
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DIVISION D.

BREAKWATERS, &c.

- 60.** Proposed breakwater for the Island of Portland (scale, 8-in. to the mile). By Capt. Clinch, R.N. 1843.
 - 61.** Basis of proposed harbour of refuge at Dover.
By Mr. William B. Basden, Purser, R.N. 1845.
 - 62.** Part of the south slope of the Plymouth breakwater, intended to show the position and construction of the three course granite butts for securing the work from the action of the waves. 1855.
 - 63.** Plymouth breakwater.
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DIVISION E.

SEMAPHORES, BEACONS, BUOYS, &c.

- 80.** Model of semaphore, with arms to the same.

81. Telegraph, with table of symbols.

By Mr. Henry D. P. Cunningham.

82. Eight telegraph signals.

83. Model of an eight-foot buoy. Keel, interior, hoop, and crown of oak ; side frames of $2\frac{1}{2}$ in. deal, filled in with cork.

84. Oak keel for 10-foot buoy.

85. Gresham's patent record buoy.

86. Semaphore from Messrs. Henry Maudslay & Co.

87. Two floating beacons (A. and B.) and one floating buoy (C.)

Proposed by Mr. Gale, Hull. 1853.

88. Pattern of Mitchell's patent screw moorings, with the capstan head for turning it into the ground.

CLASS XIII.

Plans and Compositions for the Preservation of Ships' Bottoms, Iron Work, &c. from the Effect of Time and Sea Water ; also Specimens showing Damage done by the same.

Divisions.

A.—Specimens of composition, &c. for preserving timber, iron, copper, &c.

B.—Plans for preserving ships' bottoms, iron work, &c., by coppering, galvanizing, &c.

C.—Specimens of the formation of fungus, barnacles, mussel shells, coral, weed, &c. on the bottoms of ships.

D.—Specimens of copper and iron bolts, sheathing, &c., after having been for some time in use.

E.—Specimens of the effect on timber, &c. of the *teredo navalis*, white ant, dry rot, &c.

F.—Relics of the "ROYAL GEORGE," sunk at Spithead in 1782, recovered in 1839 by Col. Pasley.

DIVISION A.

SPECIMENS OF COMPOSITION, &c. FOR PRESERVING TIMBER, IRON, COPPER, &c.

1. Four specimens of timber (A. B. C. D.) which have been used for experiment with a composition for protecting

the bottoms of iron ships from fouling, or structures of wood from the sea worm, teredo, &c.

Proposed in 1847 by Mr. Hay, Admiralty Chemist, Portsmouth Yard.

These specimens were immersed in Portsmouth Harbour on the 8th September, 1847, and taken up on the 17th July, 1848. (A.) was payed with two coats of Mr. Hay's composition; (B.) with one thin coat; (C.), one half with Mr. Hay's composition and the other half with red lead; (D), a piece of unprotected wood, showing the effect the *teredo navalis* has had upon it.

2. Three pieces of copper payed with Peacock and Buchan's composition, taken from the bilge and run of the ship "VICAR OF BRAY" after three years and six months' wear, and a run of 96,000 miles on the west coast of South America. 1855.

3. Cement for covering the bottoms of iron ships inside. Proposed by Mr. Day. 1858.

4. Piece of oak after having been immersed for two hours in a composition for preserving wood.

Proposed by Mr. W. Taylor. 1860.

5. Specimen of Messrs. Thorn's composition, as proposed to be applied to ships' sides instead of the ordinary sheathing felt. Received from Mr. C. Lancaster. 1860.

6. Two specimens (A. and B.) of blocks of oak attached with Jeffery's marine glue, and tested to try its adhesive quality. (A.), two oak blocks, size, 16 superficial inches; on being tested, the wood split at 225 lbs. on the square inch; (B.), two oak blocks, size 16 superficial inches; on being tested, the screws drew out at a strain of 330 lbs. per square inch. 1843.

7. Piece of deck with two seams, one (A.) payed with marine glue, the other (B.) with pitch, showing the different effect of concussion on each seam. 1853.

8. Piece of deck with three seams, one seam (A.) payed with a composition of shellac and caoutchouc solution, another (B.) with a composition of one part marine glue and one part pitch, another (C.) with one part marine glue and two parts pitch.

Proposed by Mr. A. Jeffery on account of the rise in the price of the materials for making his glue in 1861.

9. Piece of deck with three seams, one seam (A.) payed with all Jeffery's marine glue, another (B.) with a mixture of one part glue and one part pitch, another (C.) with all pitch. These seams have been hit with a hammer to show their relative adhesive strength under concussion.

Proposed by Mr. A. Jeffery on account of the rise in the price of the materials for making his glue in 1861.

10. Piece of deck with three seams, one seam (A.) payed with Jeffery's glue, another (B.) with a mixture of one part glue and one part pitch, another (C.) with a mixture of one part glue and two parts pitch.

Proposed by Mr. A. Jeffery, on account of the rise in the price of the materials for making his glue in 1861.

11. Four specimens of compositions for coating iron ships.
By Messrs. Thorn & Co. 1861.

12. Three specimens of composition for preserving iron.
By Mr. R. Roper. 1862.

13. Iron plate sunk in the basin at Sheerness Yard on the 2nd of October 1862, and raised in December 1862, to test a composition for preserving iron.

By Mr. R. Roper. 1862.

14. Cement for coating the inside of iron ships.
By Mr. G. Peacock. 1862.

15. Patent waterproof glue for filling up the spaces in the bilges of iron ships.

Proposed by Mr. G. Weeks, of the Patent Waterproof Glue Company. 1862.

16. Two sections showing a mode of filling up angles and recesses of iron ships with cement and charcoal.

Proposed by Portsmouth officers for the "RESISTANCE," and sanctioned by the Lords of the Admiralty for adoption in the "ACHILLES." 1863.

17. Piece of iron partly coated with a varnish as a substitute for red lead for the iron work in ships.

Proposed by Mr. N. Barnaby. 1864.

18. Cement for covering rivet heads.

By Mr. C. Parkinson. 1864.

19. Specimen of hoop iron, of which the bright end was embedded 12 years in Portland cement, while the rusty

end was exposed to the air, serving to show the preserving action of Portland cement on iron.

Messrs. J. B. White & Brothers, 17, Millbank Street. 1864.

20. Piece of iron partially covered with a composition for preserving iron. Proposed by Mr. J. H. Maw. 1864.

21. Two specimens of composition for lining the insides of iron ships. Proposed by Mr. Spence. 1864.

22. Plate covered with a cement for coating iron ships' bottoms to prevent their fouling; this plate has been under water 14 months. By Mr. C. Parkinson. 1864.

23. Two specimens of iron coated with bitumen and copper, in a finely divided state.

By Mr. C. W. Lancaster. 1864.

24. Two bottles of composition for iron ships' bottoms, one anti-corrosive, the other anti-fouling.

By Mr. T. Cooper. 1864.

25. Specimen of iron coated with gutta percha to prevent oxidation, fouling, &c., also to enable copper to be placed on iron ships' bottoms over the gutta percha.

By Mr. W. C. J. Macmillan. 1864.

26. Fifteen pieces of fir, prepared for experiment as stated below, and immersed in sea water under the south jetty of Portsmouth Dockyard for 18 months, from 10th September 1862 till 15th April 1864, to test the relative preservative and antifouling properties of the several compositions which were applied to them.

Compositions.

	No. of Coats.
A.—Hay's new antifouling composition	- 1
B.—Hay's new antifouling composition	- 2
C.—Hay's waterproof glue varnish	- 2
" new antifouling	- 1
D.—Hay's protective varnish	- 1
" old antifouling	- 1
E.—Red lead	- 2
F.—Dublin Co.'s varnish.	
G.—Momma of Dusseldorf's "substitute for tar"	- 2
H.—Hay's protective varnish	- 1
" new antifouling	- 1
I.—Hay's old antifouling	- 1
" new antifouling	- 1

	No. of Caste.
J.—Red lead - - - - -	2
Hay's new antifouling - - - -	1
K.—Monsieur Gilbert's composition - -	2
K ^a .—Wood painted by Mons. Gilbert, and received ready for experiment.	
L.—Peacock and Buchan's composition -	2
M.—McCree's grease - - - - -	2
N.—White's white paint - - - - -	2

DIVISION B.

PLANS FOR PRESERVING SHIPS' BOTTOMS, IRONWORK, &c., BY COPPERING, GALVANI- ZING, &c.

41. Nails for ships' decks, "tinned" to preserve them.
By Mr. Moffat. 1829.

42. Two plates of Morewood and Rogers's patent gal-
vanized tinned iron. 1855.

43. Piece of iron subjected to Mr. Bezlay's process of
coating with zinc to preserve it from rust, &c. 1861.

44. Plan for sheathing iron ships with metal or copper;
in this sample the india-rubber sheet is attached to the
metal by Mr. Daft's patent process.

Proposed by Mr. G. F. Muntz. 1861.

45. Plan for copper-sheathing iron ships.

By Mr. T. B. Daft. 1861.

46. Sample of yellow metal, attached as sheathing to a
piece of the iron skin of a ship by ebonite plugs, with a
sheet of india-rubber interposed between the iron and
yellow metal, insulating the metals one from the other.

Sent to the Admiralty by Mr. T. B. Daft. 1861.

47. Plan for sheathing iron ships with wood, in order
that they may be coppered.

Proposed by Mr. J. Grantham. 1861.

48. Iron plate, showing a plan for coppering iron ships.

By Mr. Lancaster. 1862.

49. Four plates, showing a plan for coating iron vessels
with copper.

By Mr. J. Needham. 1862.

50. Metal sheathing for iron ships.

By Mr. Robert Griffiths. 1862.

51. Proposed mode of metal-sheathing the bottoms of iron and armour-plated ships.

By Mr. J. G. Redman. 1862.

52. Belt of vulcanized india-rubber, 18 inches broad and $\frac{5}{8}$ -inch thick, to be placed between the armour plates and the sheathing on the bottom, to protect the armour plates from the corrosive effects of the copper on the bottoms of ships.

Proposed by Mr. William Ladd, Master Shipwright, Deptford Yard. 1863.

53. Two specimens of a plan for coating iron with copper.

Proposed by Mr. J. Chester. 1863.

54. Two iron plates partly covered with white Dutch tiles, with some loose tiles, showing a plan proposed for coating iron ships' bottoms. 1863.

55. Iron plate covered with enamelled tiles bedded in cement, showing a plan for preserving the bottoms of iron-cased ships.

Proposed by Mr. S. Leoni. 1863.

56. Two MODELS, showing a plan for sheathing iron ships with copper.

Proposed by Mr. W. R. Mulley. 1863.

57. Plan for attaching metal sheathing to the bottoms of iron ships.

Proposed by Mr. W. R. Mulley. 1863.

58. Four specimens which have been used as experiments with reference to the galvanic action existing between the armour plates and the sheathing of ships; they were suspended under water from the stern of a ship, below water about 15 feet, at Pembroke, in 1863.

(A.) The armour plating is separated from the Muntz's metal by $4\frac{1}{2}$ inches of lead.

(B.) The armour plating is in contact with the sheathing.

(C.) The armour plating is separated from the sheathing by a piece of wood covered with Hay's waterproof glue, and under it metal sheathing to prevent worms passing into the planking, and between the edge of this and the armour plating is a piece of india-rubber to break the contact between the edges of the metal sheathing under the wood, and the armour plating.

(D.) Zinc is in contact with the plating.

59. Two specimens, showing a plan for sheathing iron with copper.

By Mr. J. Chad. 1864.

60. Material for sheathing iron ships' bottoms.

By Mr. C. Peterson. 1864.

61. Two specimens (A. and B.), showing a plan for preserving iron ships' bottoms by covering them with glass.

(A.) The glass is attached by the cement only; (B.) it is attached by screws in addition to the cement.

Proposed by Mr. J. Leetch. 1864.

62. Two pieces of iron, coppered on the plan of Commander F. Warren, which were under water in Portsmouth Harbour from September 1863 to May 1864.

63. Three pieces, showing a plan for coating iron with copper.
By Mr. F. M. Green. 1864.

64. Two of Brown's vitreous plates for sheathing the bottoms of iron ships. A trial was made of this plan on H.M.S. "ROYAL SOVEREIGN" and "ROYAL OAK" in 1864.

65. Brown's vitreous sheathing. Specimens of plates taken from the "WARHOB," after having been on that vessel from July to November 1863.

66. Specimen showing a plan for coppering iron ships' bottoms with glass insulator.

By Mr. W. F. M. Green. 1864.

67. Two specimens showing a plan for attaching metal sheathing to iron by means of pegs, not at right angles, but alternately in opposite directions to each other.

By Mr. J. White. 1865.

DIVISION C.

SPECIMENS OF THE FORMATION OF FUNGUS,
BARNACLES, MUSSEL SHELLS, CORAL,
WEED, &c., ON THE BOTTOMS OF SHIPS.

81. Fungus found between the heels of the after cant timbers and fillings of the "BELLEISLE."

82. Fungus found in the seat of a dowel.

83. Fungus taken from end of the main deck beam of "LE TRAVE."

84. Fungus found in the hole of a treenail.

85. Barnacles from the bottom of a timber vessel, from Sierra Leone.

86. Shells taken from the timber ship "OCEAN," while unloading a cargo of Italian oak.

- 87.** Barnacles and shells formed on the bottom of H.M.S. "FLY," in the Pacific.
- 88.** Barnacles on a piece of copper, from a ship's bottom.
- 89.** Coral taken from the bottom of H.M.S. "MONARCH," Malta Harbour.
- 90.** Coral weed taken from the bottom of H.M.S. "QUEEN."
- 91.** Fungus taken from the timbers of the "IMPREGNABLE." 1815.
- 92.** Specimen of the dry rot with fungus vegetated over an opening, taken from the "BOURBONAISE" Frigate. June 1816.
- 93.** Barnacles taken from the bottom of H.M.S. "MODESTE," from China. March 1834.
- 94.** Piece of the bottom of a boat, with barnacles, which had lain sometime in the Boat Basin, Sheerness Yard. 1837.
- 95.** Barnacles and mussel shells from the bottom of H.M.S. "WINCHESTER," docked at Chatham. Oct. 1838.
- 96.** Coral weed from the bottom of H.M.S. "DIDO," in the Tagus. Oct. 1838.
- 97.** Barnacles on the copper, taken from H.M.S. "BLAZER." 1840.
- 98.** Zoophytes found adhering in large quantities to the copper on the bottom of H.M.S. "CONFIANCE," when taken into dock, at Woolwich Yard. July 1841.
- 99.** Piece of false keel with barnacles, taken from H.M.S. "VESTAL," on her return from the West Indies. Aug. 1842.
- 100.** Barnacles taken from the bottom of H.M.S. "LARNE," on her return from China. March 3, 1843.
- 101.** Barnacles taken from the stern part of the bottom, a little below the water-line, of H.M.S. "BONETTA." Jan. 20, 1844.
- 102.** Barnacles taken from the copper of H.M.S. "PENELOPE." Portsmouth. June 1846.
- 103.** Shells and incrustations taken from the copper of H.M.S. "GLEANER." Bermuda. Nov. 1846.
- 104.** Shells and barnacles taken from the bottom of H.M.S. "SHARPSHOOTER," and forwarded to the Controller of the Navy, by Capt. Broadhead. Sept. 24, 1862.

105. Two pieces of glass taken from the bed of the river Exe, 25th Nov. 1863, by Mr. George Peacock, formerly Master, R.N., to show how small oysters and coralline worm shell adhere to glass.

DIVISION D.

SPECIMENS OF COPPER AND IRON BOLTS, SHEATHING, &c. AFTER HAVING BEEN FOR SOME TIME IN USE.

121. Grains of sheet copper from the bottom of the "ROYAL GEORGE."

122. Incrustations taken out of the boiler of the "AFRICAN" steam vessel. 1830.

123. Piece of copper removed from the false keel of H.M.S. "INCONSTANT," when she struck the ground in the river St. Lawrence on her passage to England with Lord Durham. Plymouth Yard. 1838.

124. Portion of galvanic iron chain attached to the paddle box of the steamer "TAY," during two voyages to the West Indies.

125. Two cast-iron protectors (A. and B.), on Sir Humphrey Davy's plan, for preserving the copper on ships' bottoms. (A.) is the cast-iron protector taken from H.M.S. "CHICHESTER" in 1846, when, by the action of the sea water, it was found to have been reduced to a substance resembling plumbago. (B.) is another cast-iron protector, but less worn.

126. Part of a copper bolt from the "TALAVERA," destroyed by fire at Plymouth in 1840.

127. Piece of the "SPHINX," supposed to be 2,000 years old, brought to England in the "TALAVERA" in 1839. Exposed to the fire which destroyed the "TALAVERA" in 1840.

128. Two sheets of copper (A. and B.) taken from the bottom of H.M.S. "SATURN," coppered in December 1817, taken off in 1845, showing the difference in their weights.

(A.) taken off port bow :—		lbs.	ozs.
Original weight	-	9	4
Present weight	-	8	5½
Reduced in 28 years	-	0	14½

(B.) taken off port side midships:—

	lbs.	ozs.
Original weight -	-	8 0
Present weight -	-	6 14½
Reduced in 28 years -	-	1 1½

129. Sheet of 32 oz. copper put on the rudder of H.M.S. "ROVER" at Bermuda, Nov. 1840; taken off Dec. 1841.

130. A specimen of a full-sized sheet of copper for ships' bottoms as used in H.M. service at the present time. (1865.)

DIVISION E.

SPECIMENS OF THE EFFECT ON TIMBER, &c.,
OF THE *TEREDO NAVALIS*, WHITE ANT,
DRY ROT, &c.

151. Effect of the white ant on teak.

152. Effect of the white ant on oak.

153. Effect of the white ant on fir.

154. Caulking of a filling between the timbers behind the plank from the "MEANEE," of 80 guns, showing the effects of the white ant. 1847.

155. Specimen of the destruction by white ants of a quantity of shavings on which some hose was packed and sent out from England with a forcing pump for the Admiral's house at Trincomalee Naval Yard, Nov. 1841.

156. Head of a teak shore, showing the effect of the white ant making a passage through the same; taken from under the bottom of H.M.S. "MEANEE," Bombay, Sept. 1847.

157. Specimen of the effect of the *Teredo navalis* on beech.

158. Specimen of the effect of *Teredo navalis* on African oak.

159. Piece of ship's keel, showing the effect of the *Teredo* upon fir.

160. Piece of main keel, showing the effect of the *Teredo* on elm.

161. Piece of the bottom of the English Schooner "CURRENCY LASS," South America, showing the effect of the *Teredo* on African oak.

162. Two pieces of timber, one prepared with Kyan's composition, the other unprepared, showing the comparative effects of the *Teredo*.

163. Effect of the *Teredo* on cedar.

164. Effect of the *Teredo* on fir.

165. Effect of the *Teredo* on New England fir.

166. Effect of the *Teredo* on elm.

167. Specimen of the effect of the *Teredo navalis* on elm, taken from the bottom of H.M.S. "HYACINTH." Jan. 1833.

168. Part of the keel of H.M.S. "IMOGENE," showing the effect of the *Teredo* on birch. 1834.

169. Specimen of the effect of *Teredo navalis* on elm taken from the gripe of H.M.S. "SOUTHAMPTON." 1835.

170. Effect of the *Teredo* on fir, from the groundway supporting the ways for launching the "NILE." August 1838. Plymouth Yard.

171. Specimen of the effect of the *Teredo navalis* on timber taken from the bottom of the "THAMES," West India Packet, in 14 days after the copper was displaced. Portsmouth, 1842.

172. Effect of the *Teredo navalis* on H.M.S. "THUNDERER." Received from Commander Barnett. 1842.

173. Effect of the *Teredo navalis* on a piece of the anchor stock of the United States Frigate "COLUMBIA." From Sir T. Pasley. 1844.

174. Piece of the planking of the second cutter of H.M.S. "SALAMANDER," showing the effects of the *Teredo navalis*.

From Rear-Admiral Sir G. F. Seymour, Tahiti. 1845.

175. Piece of oak, showing the destructive effects of the *Teredo navalis*, taken from H.M.S. "MERLIN." Woolwich Yard, August 1857.

176. Two pieces of false keel, elm timber, damaged by the *Teredo*, from H.M.S. "HANNIBAL."

Received from Admiral Sir Houston Stewart in 1857.

177. Parts of the garboard strake of H.M.S. "BARRACOUTA," and trenails from its bottom, showing the effect of the *Teredo*. Woolwich Yard, 1858.

178. Fossil wood bored by the *Teredo navalis*, from a large piece dredged from the sea off Languard Fort. 1860.

179. Timber from the hull of H.M.S. "ODIN," showing the effect of the *Teredo* on the ship's side just above the copperline in 1862.

180. Substance similar to black marl or clay, taken out of the heart of a log of African oak when converting at Sheerness, Oct. 1839, with a piece sawn out of the same.

181. Piece of Tuscan oak, showing the destructive effect of a worm or grub, with a specimen of the grub.

182. Specimen of the grub-worm in oak.

Received from Commander Drury, Norfolk Island, 1854.

183. Piece of cement stone, with a worm which was found alive when the stone was broken.

184. (a.) Treenails from the bottom of a ship, showing the effects of the action of the water between the plank and the timbers. (b.) One rough and two compressed tree-nails which have not been exposed to the action of the water.
Sent by Capt. Shirreff, 1842.

185. Piece of teak, showing the shell of the *Pholas clavata* of Lamareck.

186. Fossil specimen perforated by the *Pholas clavata*.

187. Piece of chalk perforated by the *Pholas clavata*.

188. Slab cut from a stone block recovered from Portsmouth Harbour in 1816, showing the perforations by the *Pholas clavata*.

DIVISION F.

RELICS OF THE "ROYAL GEORGE," SUNK AT
SPITHEAD IN 1782, RECOVERED IN 1839 BY
COL. PASLEY.

201. Two musket stocks and part of the barrel.

202. Two scabbards.

203. Part of a large block.

204. Iron bolt, with piece of timber.

205. Five sheaves of blocks.

206. Iron cleat.

207. Three 10-inch single sheaved blocks.

208. Deep-sea line block.

209. Tompion for gun.

- 210. Pair of shoes.
- 211. Part of wood quadrant by Gilbert.
- 212. Copper hoop.
- 213. Two water-mark numbers.
- 214. Metal jack wheel.
- 215. Metal candlestick and buckle.
- 216. Hook and thimble, with rope.
- 217. Part of a case of surgical instruments.
- 218. Part of brass front of cabin stove.
- 219. Pewter spoon.
- 220. Two pieces of rope.
- 221. Carpenter's hammer and part of a two-foot rule.
- 222. Walking stick.
- 223. Piece of bolt and metal nut.
- 224. Part of a breeching ring.
- 225. Eye and ring bolt.
- 226. Shackles.
- 227. Block sheave and pin.
- 228. Piece of iron.
- 229. Piece of candle.
- 230. Grains of sheet copper from the bottom of the ship.

CLASS XIV.

Tools, Machines, and Machinery.

Divisions.

- A.—Hand tools.
 - B.—Machines for dock-yards.
 - C.—Steam engines and boilers.
-

DIVISION A.

HAND TOOLS.

- 1. (A.) Wood pattern (with a steel cutter) of a tool for boring holes for $\frac{3}{4}$ -in. rings for the heads and points of bolts, (B.) an iron tool on the same plan for 1-in. rings; in use in H.M. Yards about the year 1800.

2. Wood pattern of a tool for boring holes for 1-in. rings, for the heads and points of bolts.

Proposed by Mr. John Phillips, leading man of shipwrights, Pembroke Yard, in 1848, and ordered to be tried.

3. Three patterns (A., B., and C.) of dowelling engines, with moveable cutters of various sizes, as formerly in use.

4. Two patterns (A. and B.) of dowelling engines, with moveable cutters of various sizes, as formerly in use.

5. Model of a dowelling engine, with a guide attached, for boring holes in the heads and heels of timbers.

Proposed by Mr. Wm. Row, shipwright, Chatham Yard. 1825.

6. Pattern of a dowelling engine, with screw spindle and moveable cutter.

Proposed by Messrs. Edward Gibson and Son. 1843.

7. Three patterns (A., B., and C.) of dowelling engines (A., 3½-in., B., 4-in., and C., 5-in.) as now (1864) in use in H.M. Dockyards.

8. Model of a machine used in H.M. Dockyards for boring out holes for Lang's tube scuttles.

Proposed by Mr. J. Phillips, Acting Inspector of Shipwrights, Pembroke Yard. 1858.

9. Model of a frame saw, proposed for cutting out hawse holes.

10. Lever machine for drawing nails or small bolts, formerly in use in H.M. Dockyards.

11. Two wood patterns (A. and B.) of machines on different plans, for drawing bolts.

12. Two wood patterns (A. and B.) of machines on different plans, for drawing bolts, as now (1864) in use in H.M. Dockyards.

One plan (B.) was proposed by Mr. J. P. Wallis, Foreman H.M. Dockyard, Plymouth. About 1830.

13. Model of a machine for drawing bolts.

Proposed by Mr. John Corner, shipwright, Sheerness Yard, in 1864, and now (1864) under trial.

14. Pattern of a machine for drilling holes in chain cable shackles.

Proposed by Mr. Chisman, engineer and mechanist, Portsmouth Yard. 1861.

15. Pattern of a machine for drilling holes in chain cable shackles.

Proposed by Mr. Cotsell, foreman, Devonport Yard.
1861.

16. Pattern of a machine for drilling holes in chain cable shackles.

Proposed by Mr. G. Robinson, Devonport Yard. 1861.

17. Clamps for drawing timbers together.

18. Clamps for drawing timbers together.

By Mr. H. Tremaine.

19. Clamps on two different plans (A., B.), for drawing timbers together. A., the plan in use in H.M. Yards prior to 1831; (B.), the plan then introduced and continued to the present time (1865).

20. Model of a double-handled saw, proposed for cutting iron, &c.

21. Iron wedge and ring, for raising heavy weights, such as blocks of stone, &c., and a small brass wedge and ring (on the same plan) fixed in a piece of wood, to show the manner of using it. 1860.

22. Model of a gauge used for cutting strips of copper for lightning conductors, and other purposes.

Proposed by Mr. G. L. Cole, Devonport Yard, in 1842, and then adopted.

23. Link mould for getting the form of boat timbers.

24. Wood pattern of a tool for taking out the old caulking, before re-caulking a ship, being an improvement, by the officers of Chatham Yard, on the tool used at Devonport.

25. Shipwright's tools used by the natives of Bombay.
Sent by Mr. Buck, Foreman of shipwrights, 1843.

26. Bevel with scale, and figures for measuring angles.

27. Patent safety spring for use in lifting heavy weights, to break the jar of any sudden strain.

By Mr. R. Saunders, 1864

DIVISION B.

MACHINES FOR THE DOCKYARDS.

41. A set of models (8 in No.) of the block-making machinery, invented by Sir Isambard Brunel, for the use of the Government, and set up in Portsmouth Dockyard, by Messrs. Maudslay & Sons, in 1804, where it has remained in use to the present time (1865).

- (a.) Machine for boring.
- (b.) Machine for mortising.
- (c.) Circular saw for cornering.
- (d.) Large wheel for shaping.
- (e.) Machine for scoring.
- (f.) Machine for cutting sheaves.
- (g.) Machine for turning sheaves.
- (h.) Machine for turning pins for sheaves.

42. Machine for rolling bars of metal for bolts, &c.
By Sir Robert Seppings, 1829.

43. Machine fitted with cylinders for the purpose of flattening old copper sheets before they are again replaced on a ship's bottom. (Scale 3 in. to a foot.)

By Sir Robert Seppings, 1829.

44. Carriage for conveying timber. 1850.

45. Machine to be worked by hand, for cleaning shot or chain cables.

46. Machine to be worked by hand, fitted with multiplying gear for cleaning shot or chain cables, in use in H. M. yards, prior to the application of steam to this purpose.

47. Machine to be worked by steam, with multiplying gear for cleaning shot or chain cables.

Proposed by Mr. P. Laurie, Millwright, Sheerness, 1858.

48. Machine to be worked either by hand or steam, fitted with multiplying gear for cleaning shot or chain cables, erected at Sheerness yard, in 1858.

49. Machine for cutting wire rope.

Proposed by Mr. J. Briscoe, smith, Sheerness Yard, 1863.

50. Brass model of a beam carriage used by Messrs. Napier, of Glasgow, for facilitating the welding of the knees of beam ends.

From Messrs. Napier, 1863.

DIVISION C.

STEAM ENGINES AND BOILERS.

71. Working model of the longitudinal section of the engines of 100-horse power, made by Messrs. Maudslay, Sons, and Field for H.M.S. "LIGHTNING," 1823.

72. Working model of a portable land engine, on the plan of Messrs. Maudslay, Sons, & Field. 1834.

73. Apparatus for disconnecting the paddle wheels from the engines, by Messrs. Seaward, as applied to H.M.S. "ALECTO," and others. 1837.

74. Marine tubular boiler of 60-horse power, in use in the royal navy in 1844.

75. Marine boiler on the plan of the late Admiral, the Earl of Dundonald, model of one of four of the parts fitted on board the "JANUS." 1844.

76. Double cylinder steam engines, as designed for working a screw propeller on board H.M.S. "RIFLEMAN," or "SHARPSHOOTER," by W. Fairbairn & Sons. 1845.

77. Stern tube, glands, &c. for screw ships.

By Mr. W. Evans, Chief Engineer, H.M.S. "CENTURION." 1860.

78. Two bearings fitted with white metal, which have been in use on the Great Western Railway.

J. Woods & Co.

79. Tubular apparatus for super-heating steam. 1863.

80. (A.) Atlas iron plate, (B.) best iron plate for boilers.

From the Atlas Steel and Iron Works, Sheffield. 1864.

CLASS XV.

Figure-heads, Busts, Carvings, &c.

1. Figure-head of the "ROYAL CHARLOTTE" yacht belonging to His Majesty George III.; a very good likeness of the late Queen Charlotte.

2. Bust figure-head of H.M.S. "THAMES."

3. Figure-head of H.M.S. "SHANNON," the vessel which fought the memorable action with the American frigate "CHESAPEAKE."

4. Plaster bust of Admiral Viscount Nelson.

5. Plaster bust of James Watt.

6. Carved work for bow and stern, proposed for the "ROYAL OAK" class, by Mr. Hellyer, carver to the Admiralty. 1860.

7. Pattern of carved rope for H.M. Yacht "OSBORNE," formerly "VICTORIA AND ALBERT." By Mr. Hellyer. 1842.

8. Specimen of leather pressed to imitate carved work.
1843.

CLASS XVI.

Drawings, Paintings, &c.

1. Portrait of Sir Thomas Slade, Surveyor of the Navy from 6th August 1755 to 22nd February 1771.

2. The "GREAT HARRY," launched 13th June 1514. (See Class I., No. 1.)

3. The "SOVEREIGN OF THE SEAS," built at Woolwich in 1637. (See Class I., No. 3.)

4. Side view of the "SOVEREIGN OF THE SEAS," or "ROYAL SOVEREIGN," built at Woolwich in 1637. (See Class I., No. 3.)

5. Right aft view of the stern of the "ROYAL SOVEREIGN," built at Woolwich in 1637. (See Class I., No. 3.)

6. Right aft view of a stern similar to the "CALEDONIA," 120 guns. 1800. (See Class I., No. 22.)

7. Descriptive sections of Sir William Symonds's ships, from a first-rate of 110 guns to a cutter tender.

8. Two longitudinal sections in perspective, showing the system on which the "TREMENDOUS," "RAMILLIES," and "ALBION," of 74 guns were rebuilt in H.M. Dockyard, Chatham, in the years 1830-32, by Sir R. Seppings.

By Mr. T. Strickland.

9. Longitudinal and transverse sections of the engine-room of H.M. steam frigate "GORGON," built at Pembroke in 1837, Messrs. Seaward and Capel, Engineers. (On a $\frac{3}{8}$ -in. scale.)

10. Sketch representing the profile and plan of H.M.S. "KENT," with the number of purchases for hauling her on the slip, an operation which was executed in 40 minutes at Plymouth yard.

(This sketch will be found in Class XI., No. 4.)

CLASS XVII.

Miscellaneous, to include all that cannot be classed under any of the foregoing Heads.

1. MODEL representing a section of the French frigate "CALYPSO," showing the damage to the port side of the ship by the blow she received from H.M.S. "TALAVERA."

2. Syringe for injecting tar, &c. between a ship's timbers.
By Sir R. Seppings.

3. Two sham bolts ("devils") out of the iron knees of the "VENERABLE."

4. Apparatus for fumigating between ship's decks.
Proposed in 1846.

5. Wright's registered portable refrigerator. 1851.

6. Specimen of fossil elm. Island of Grain.

7. Specimen of fossil fir.

8. Piece of petrified timber. Received 1855.

9. Fac-simile of the prostrate column at Alexandria, presented to His Majesty George IV. by his Highness Ali Mahomed, Viceroy of Egypt, with a model of the roller carriage for raising and transporting the column to the ship.

10. MODEL showing the state in which H.M.S. "PIQUE" was found on being placed in dock at Portsmouth on her arrival in England from the Canadas in October 1835.

On entering the Straits of Belleisle from the westward on the evening of 22nd September 1835, the weather became thick and hazy; the Channel course had been shaped, but, owing to a strong current, the ship was set on to the Labrador shore, and took the rocks about Point Forteau; a

heavy sea setting along the shore, caused the ship to strike heavily until she was, by great exertions and skill, hove off on the morning of the 23rd.

The ship's company, being much exhausted by a night of severe work, had been sent below to get their breakfast, the captain, the Hon. H. J. Rous, alone remaining on the deck to watch whether, in any of the lifts caused by the sea, the ship showed any indication of moving to her anchors and cables, which had been laid out by the boats in deep water. His eye being fixed on two objects on the beach in line, he observed the ship make a sudden start to her tightened cable; this he intimated in a clear voice to the ship's company, who, though silent from fatigue, hunger, and something akin to despondency, seeing that the ship had been crashing heavily on the rocks for 11 hours, responded by a ringing cheer, and flew to their stations. As the purchases were worked the ship began to move off rapidly to a certain point, when some portion of her now seriously damaged keel probably caught a rock, but the captain, ever ready, at once ordered everybody to the after end of the ship, and then, by the word of command, caused all to rush to the bow; the device was a complete success, for off she went at once into deep water. She was found to be leaking freely, *i.e.* from 14 to 24 inches per hour, but the pumps being good and the rudder appearing sound, it was decided to proceed on the voyage to England.

On Sunday, the 27th September, being then about 300 miles from the land, the rudder broke away, leaving the ship nearly helpless; a heavy westerly gale ensued, during which the ship was laid to under bare poles, and the leak increased in one night to three feet per hour.

An account of the subsequent voyage home would be a narrative of interest. Here it is sufficient to say that the ship succeeded in getting into the English Channel and anchoring, on the night of 11th October, off the Caskets, and that on the following day she again weighed, and, with the aid of a cable astern to do duty as a rudder, reached St. Helen's at 4 a.m. on 13th October.

During the interval between the "Pique" losing her first rudder and arriving at home no less than four temporary rudders had been constructed, two known as the "Pakenham" rudder, and one as the "Grafton" rudder; but the more simple and manageable auxiliary rudder, by which the ship was mainly steered, was a hemp cable led out of the stern hawse, to the end of which a few pigs of iron ballast were secured, and from which steering lines were

led to a yard across the stern, and so to the capstan; this, with well-balanced sail on the respective masts, and the cross-jack and mizen topsail braces entrusted always to the boys and cadets, for 21 days, day and night, enabled the ship to keep a tolerably fair course. All pumps were worked steadily for 20 minutes out of every hour for 21 days.

11. MODEL of a hut to contain 20 men (on $\frac{3}{4}$ -in. scale).
By Mr. R. Blake, Plymouth. 1855.

12. Three specimens of a fibrous material to prevent ships sinking by filling them up with it, or by placing it between the iron casing and the ship's side.

Proposed by Mr. J. Barling. 1860.

13. Material for building ships so that they may be unsinkable.
Proposed by Mr. Battley. 1862.

14. Plan for fouling the screw of an enemy's ship by means of a number of floats or buoys, having a network of rope or chains suspended from them, to be moored off any part of the coast threatened with invasion.

By Mr. J. D. Douglas. 1861.

15. Specimen of castings of metal nails for coppering the bottoms of wood ships in H.M. service. 1860.

16. Two pieces of an iron bolt supplied to H.M.S. "RESISTANCE," by the contractors who built her; the bolt was imperfectly welded, and broke while drilling at general quarters in 1863.

17. Cofferdam to enable ships' bottoms to be cleaned, which may also be used as a life-boat.
By Mr. J. White. 1863.

18. Gutta-percha speaking-trumpet.

From the London Gutta-percha Company.

19. Piece of cement taken from an opening between the timbers of a ship; a plan of Sir Robert Seppings about the year 1812. Water runs out from this cement on certain changes of weather.

20. Improved form of nails.

Proposed by Mr. W. Larcom. 1864.

21. Model of a hammer to weigh 24 tons, two of which are proposed to be so fitted that they may be forced out horizontally from the bow against an enemy's ship; the arms or rods supporting the hammer are also to be armed with knives for cutting away the enemy's rigging, &c.

Proposed by Mr. H. Jennings. 1865.

PART II.

COLLECTION OF MODELS FROM PRIVATE SOURCES.

PAINTINGS.

1. A dockyard, by J. Cleveley, (b. 1745, d. 1786.)
Lent by Her Majesty.
2. Woolwich Dockyard, by R. Paton, (b. 1720, d. 1795.)
Lent by Her Majesty.
3. Chatham Dockyard, by R. Paton, (b. 1720, d. 1795.)
Lent by Her Majesty.
4. Deptford Dockyard, by R. Paton, (b. 1720, d. 1795.)
Lent by Her Majesty.
5. Sheerness Dockyard, by R. Paton, (b. 1720, d. 1795.)
Lent by Her Majesty.
6. Portsmouth Dockyard, by R. Paton, (b. 1720, d. 1795.)
Lent by Her Majesty.
7. Blackwall, by J. T. Serres, painted about 1790.
Lent by Her Majesty.

8. Stern view of H.M.S. "ROYAL GEORGE," 1st rate, 100 guns, length 178 ft. 0 in., breadth 51 ft. 9½ in., depth 21 ft. 6 in., tonnage 2,041. Laid down at Woolwich Yard in 1746, launched in 1756, overset 29th August 1782, "she being heeled to come at the pipe that leads to the well."

The complement of men was 850.

Drawn by Josh. Williams, painted by Josh. Marshall.
1774. Presented by Her Majesty.

9. Bow view of H.M.S. "ROYAL GEORGE" (same ship as the preceding).

Drawn by J. Binmer, painted by Josh. Marshall. 1774.
Presented by Her Majesty.

10. Stern view of H.M.S. "VICTORY," 1st rate, 100 guns, length 174 ft. 9 in., breadth 50 ft. 6 in., depth 20 ft. 6 in., tonnage 1,921. Built at Portsmouth Yard in 1737. Lost

in the English Channel in the night between the 4th and 5th October 1744, when Admiral Balchin and the crew of upwards of 1,000 men perished.

Drawn by Josh. Williams, painted by Josh. Marshall.
1744. Presented by Her Majesty.

11. Bow view of H.M.S. "VICTORY" (same ship as the preceding).

Drawn by J. Binmer, painted by Josh. Marshall. 1774.
Presented by Her Majesty.

12. Stern view of H.M.S. "BARFLEUR," 2nd rate, 90 guns, length 177 ft. 8 in., breadth 50 ft. 5 in., depth 21 ft., tonnage 750. Laid down at Chatham Yard in 1762, launched in 1768, broken up in 1819.

The complement of men was 750.

Drawn by Josh. Williams, painted by Josh. Marshall.
1774. Presented by Her Majesty.

13. Bow view of H.M.S. "BARFLEUR" (same ship as the preceding).

Drawn by J. Binmer, painted by Josh. Marshall. 1774.
Presented by Her Majesty.

14. Stern view of H.M.S. "ROYAL OAK," 3rd rate, 74 guns, length 168 ft. 6 in., breadth 46 ft. 9 in., depth 20 ft., tonnage 1,606. Laid down at Devonport Yard in 1766, launched in 1769, broken up in 1815.

The complement of men was 650.

Drawn by Josh. Williams, painted by Josh. Marshall.
1774. Presented by Her Majesty.

15. Bow view of H.M.S. "ROYAL OAK" (same ship as the preceding).

Drawn by J. Binmer, painted by Josh. Marshall. 1774.
Presented by Her Majesty.

16. Stern view of H.M.S. "INTREPID," 3rd rate, 64 guns, length 159 ft. 6 in., breadth 44 ft. 5 in., depth 19 ft., tonnage 1,374. Laid down at Woolwich Yard in 1767, launched in 1770, sold in 1828.

The complement of men was 500.

Drawn by Josh. Williams, painted by Josh. Marshall.
1774. Presented by Her Majesty.

17. Bow view of H.M.S. "INTREPID" (same ship as the preceding).

Drawn by J. Binmer, painted by Josh. Marshall. 1774.
Presented by Her Majesty.

18. Stern view of H.M.S. "PORTLAND," 4th rate, 50 guns, length 146 ft., breadth 40 ft. 6 in., depth 17 ft. 6 in.,

tonnage 1,044. Laid down at Sheerness Yard in 1767.
launched in 1770, sold in 1807.

The complement of men was 350.

Drawn by Josh. Williams, painted by Josh. Marshall,
1774. Presented by Her Majesty.

19. Bow view of H.M.S. "PORTLAND" (same ship as the preceding).

Drawn by J. Binmer, painted by Josh. Marshall. 1774.
Presented by Her Majesty.

20. Stern view of H.M.S. "EXPERIMENT," 4th rate, 50 guns, length 140 ft. 9 in., breadth 38 ft. 8½ in., depth 16 ft. 7 in., tonnage 923. Laid down at Messrs. Adams & Co.'s yard, on the Thames, in 1772, launched in 1774. Dismasted in a gale of wind, and taken the 22nd September 1779 by the French fleet, on her passage from New York to Savannah.

The complement of men was 300.

Drawn by Josh. Williams, painted by Josh. Marshall.
1775. Presented by Her Majesty.

21. Bow view of H.M.S. "EXPERIMENT" (same ship as the preceding).

Drawn by J. Binmer, painted by Josh. Marshall. 1775.
Presented by Her Majesty.

22. Stern view of H.M.S. "AMBUSCADE," 5th rate, 32 guns, length 126 ft. 3 in., breadth 35 ft. 1¾ in., depth 12 ft. 2 in., tonnage 684. Laid down at Messrs. Adams & Co.'s yard, on River Thames in 1771, launched in 1773. Taken by the "Bayonaise" in December 1798, afterwards retaken and broken up in 1813.

The complement of men was 220.

Drawn by Josh. Williams, painted by Josh. Marshall.
1775. Presented by Her Majesty.

23. Bow view of H.M.S. "AMBUSCADE" (same ship as the preceding).

Drawn by J. Binmer, painted by Josh. Marshall.
Presented by Her Majesty.

24. Stern view of H.M.S. "ENTERPRIZE," 6th rate, 28 guns, length 120 ft. 6 in., breadth 33 ft. 6 in., depth 11 ft., tonnage 594. Laid down at Deptford Yard in 1771, launched in 1774, broken up in 1807.

The complement of men was 200.

Drawn by Josh. Williams, painted by Josh. Marshall,
1775. Presented by Her Majesty.

25. Bow view of H.M.S. "ENTERPRISE" (same ship as the preceding).

Drawn by J. Binmer, painted by Josh. Marshall, 1775.
Presented by Her Majesty. 1864.

26. Stern view of H.M.S. "SPHINX," 6th rate, 20 guns, length 108 ft., breadth 30 ft., depth 9 ft. 8 in., tonnage 429. Laid down at Portsmouth Yard in 1773, launched in 1775. Taken by the French in 1779, and retaken in December 1779 by the "PROSERPINE." Broken up at Portsmouth in 1811.

The complement of men was 160.

Drawn by Josh. Williams, painted by Josh. Marshall.
1775. Presented by Her Majesty.

27. Bow view of H.M.S. "SPHINX" (same ship as the preceding).

Drawn by J. Binmer, painted by Josh. Marshall, 1775.
Presented by Her Majesty.

28. Stern view of H.M.S. "KINGFISHER," sloop, 14 guns, length 96 ft. 8½ in., breadth 26 ft. 10 in., depth 12 ft. 10 in., tonnage 302. Laid down at Chatham Yard in 1769, launched in 1770, burnt at Rhode Island, 30th July 1778.

The complement of men was 125.

Drawn by Josh. Williams, painted by Josh. Marshall.
1775. Presented by Her Majesty.

29. Bow view of H.M.S. "KINGFISHER" (same ship as preceding).

Drawn by J. Binmer, painted by Josh. Marshall, 1775.
Presented by Her Majesty.

30, 31. Two paintings of ships on copper. These paintings were used in the Royal Nursery, for the instruction of Prince William Henry, afterwards King William IV.
Presented by Mr. F. A. B. Bonney.

32. Pencil drawing of the hull of a man-of-war, "SOVEREIGN OF THE SEAS," by William Van de Velde, (b. 1663, at Amsterdam, d. 1707.)

(For description of ship, see No. 3, Class I., Admiralty Models.) Presented by Mr. George Smith.

33, 34. Two drawings. The laying off of the fore and after bodies of a steam frigate of 36 guns.

Lent by Mr. G. H. Edgecombe, Stoke (Plymouth).

35. Coloured chart. British flags.

Presented by Mr. James Reynolds.

36. Chart, partly coloured, illustrating the flags of all nations, the rigging and sails of a ship, and varieties of shipping. Presented by Mr. James Reynolds.

37. Two oil paintings of the "GREAT BRITAIN," at "Low water" and "High water," by J. Walter, 1847.

Lent by Capt. Claxton, R.N.

The "GREAT BRITAIN," 3,600 tons, was exposed 11 months in Dundrum Bay, Ireland, and nearly submerged at every high tide; the sea in south-westerly and southerly gales making a clear breach all over her.

The breakwater here represented, combined with the "GREAT BRITAIN'S" admirable build, saved the vessel. The design for the breakwater was Brunel's, and it consisted of 8,000 large faggots, 3 ft. in diameter and 12 or 13 ft. long, placed about the stern and exposed quarter, loaded with stones, and backed by two rows of birch trees, about 60 ft. long.

The "GREAT BRITAIN" was got off by Capt. Claxton, R.N.

38. Battle of Lepanto, Oct. 7, 1571. The great naval engagement between the combined fleets of Spain, Venice, Genoa, Malta, and Pius V., and the whole maritime force of the Turks. By Bonaventura Peters.

Lent by Mr. T. Dyer Edwardes.

39. Battle of Solebay, May 28, 1672, fought between the fleets of England and France on one side, and the Dutch on the other, the former commanded by the Duke of York, afterwards James II.

Lent by Mr. T. Dyer Edwardes.

40. Battle of the Doggerbank, in 1781 between the English and Dutch fleets. By T. Luny. 1781.

Lent by Mr. T. Dyer Edwardes.

41. Men-of-war in port, by Anderson, (b. 1757, d. 1837.) Lent by Mr. T. Dyer Edwardes.

42. Shipping, by Wimont.

Lent by Mr. T. Dyer Edwardes.

43. Maltese galley. Lent by Mr. T. Dyer Edwardes.

101. MODEL of the blockade-runner "EVELYN." Length 230 ft., breadth of beam 28 ft., draught of water with 1,000 bales of cotton on board 7 ft., tons 284 N.M., horse power 200; speed at full power, 17 knots. Built in 1864 by Messrs Randolph, Elder, & Co., Glasgow.

Lent by Capt. Hugh Talbot Burgoyne, R.N.

102. MODEL of masts and rigging of H.M.S. "GANGES," 8½ guns, (on a ½ in. scale). Length 196 ft., 5½ in., breadth 52 ft. 2½ in., tonnage 2,285. Laid down at Bombay in 1819, launched in 1821. Designed as "CANOPUS."

Presented by Capt. Hugh Talbot Burgoyne, R.N.

103. Longitudinal section of the "CANDIDATE" (star-board side), showing mode of construction for wooden ships approved of in 1840 by Lloyd's Committee.

Lent by Lloyd's Committee.

104. Longitudinal section of the "CANDIDATE" (port side), showing mode of construction for wooden ships, approved of in 1840 by Lloyd's Committee.

Lent by Lloyd's Committee.

105. Half-breadth MODEL of a ship in frame, showing diagonal arrangement of frames.

Proposed by Messrs. Thomas Bilbe & Co.

Lent by Lloyd's Committee.

106. Half-breadth MODEL of a ship "diagonally doubled." See Lloyd's Rules and Regulations, 1864, page 19.

Lent by Lloyd's Committee.

107. Sectional MODEL (on a ¾ in. scale) of an iron ship of 2,000 tons, illustrating Lloyd's Rules, bearing date May 21, 1857.

Lent by Lloyd's Committee.

108. Half midship section of a ship constructed on a patent taken out in 1852 by Mr. John White, of Cowes, for building ships on an improved diagonal principle without frame timbers. (See reports of the Institution of Naval Architects, vol. i., 1860.)

Lent by Lloyd's Committee.

109. Mr. Hall's MODEL, intended to show the benefit of trussing from the centre. Mr. Hall was Surveyor to the East India Company and to the Trinity Board, London.

Lent by Lloyd's Committee.

110. Model of an ancient Maltese galley, supposed to have belonged to one of the Grand Masters of the Knights of Malta, together with a small painting containing a repre-

sentation of the galley, and probably of contemporary date with it.

Lent by Mr. W. Ladd, Master Shipwright, Deptford Dockyard.

111. Mode of fitting boats either singly or in couples, for the disembarkation of troops, horses, and field-pieces. This plan was used in the landing of troops in the Crimea.

Lent by the inventor, Mr. W. Ladd, Deptford Dockyard.

112. Original design for horse stalls, as fitted at Malta, to the ships that conveyed the troops to the Crimea.

Lent by Mr. W. Ladd, Deptford Dockyard.

113, 114. Two smooth-boring auger bits, recommended by the late Mr. Joseph Tucker, joint surveyor of H.M. Navy from 1813 to 1831 for the reduction of decay in ships.

Presented by Mr. J. S. Tucker.

115. MODEL of a flat-bottomed schooner, with an outside tiller. About 1820.

Presented by Mr. J. S. Tucker.

116. MODEL of part of the frame of a ship of war, as proposed by Mr. Joseph Tucker.

Presented by Mr. J. S. Tucker.

117. Comparative MODEL, showing the oval stern, with quarter ports for guns on each deck.

Presented by Mr. J. S. Tucker.

118. MODEL of a design for a four-decked ship of war, "DUKE OF KENT," to carry 170 guns.

Proposed by Mr. Joseph Tucker in 1809, when Master Shipwright of Plymouth Dockyard.

Lent by Mr. J. S. Tucker.

119. MODEL of the midship section of a design for a four-decked ship of war, the "DUKE OF KENT," to carry 170 guns.

Proposed by Mr. Joseph Tucker in 1809, when Master Shipwright of Plymouth Dockyard.

Presented by Mr. J. S. Tucker.

120. MODEL (unfinished) of H.M. Royal yacht, "VICTORIA AND ALBERT," paddle-wheel, 600 horse power, (on a $\frac{3}{16}$ in. scale.) Length 300 ft., breadth 40 ft. $3\frac{1}{4}$ in., depth 24 ft. 6 in., tonnage 2,345. Laid down at Pembroke Yard in 1854, launched in 1855. Designed by the Surveyor's Department.

Modelled and presented by Mr. D. Harvey, late Modeller at the Admiralty, Somerset House.

121. MODEL of a life boat, 1854 (on a $\frac{3}{4}$ in. scale). Length 32 ft., breadth 8 ft. 4 in.

Proposed and presented by Mr. D. Harvey.

122, 123. Two MODELS of ship's binnacles. Proposed for the Navy, 19th March 1853, as an improvement on the square box then in use (on a 3 in. scale).

Presented by Mr. D. Harvey.

124. MODEL of H.M.S. "AJAX," (on a $\frac{1}{2}$ in. scale), 74 guns, tonnage 1,953. Laid down at Messrs. Randall's yard, on the Thames, in 1795, launched in 1798, burnt in 1807.

This model was constructed by the late Sir Joseph Sydney Yorke, Bart., between the years 1797 and 1808.

Presented by the Earl of Hardwicke.

125. MODEL of a Ceylon boat.

Presented by Mr. T. D. E. Gibson.

126. MODEL of a gunboat.

Presented by Mr. J. S. Tucker.

127, 128, 129. Three MODELS of faggot-built masts.

Presented by Mr. J. S. Tucker.

130. MODEL of a balance rudder.

Proposed and presented by Mr. J. S. Tucker.

131, 132. Two MODELS of midship sections of vessels.

Presented by Mr. J. S. Tucker.

133. MODEL showing a method of total under-side fastenings for deck planking.

Presented by Mr. J. S. Tucker.

134. Armour-plated frigate, length 444 ft.

Proposed and lent by Mr. George Turner, Master Shipwright, Woolwich Dockyard.

135. Armour-plated frigate, length 330 ft.

Proposed and lent by Mr. George Turner, Master Shipwright, Woolwich Dockyard.

136. MODEL of a yacht built for the Earl of Morley. Built at Plymouth 1858. Length 27 ft., breadth 8 ft. 4 in.

Designed and lent by Mr. George Turner, Master Shipwright, Woolwich Dockyard.

137. MODEL showing the external iron riders of the "CALEDONIA," iron-cased frigate, built in 1863.

Lent by Mr. George Turner, Master Shipwright, Woolwich Dockyard.

138. Galley life boat, length 36 ft., breadth 6 ft. 10 in. Built at Devonport in 1857 for Miss Burdett Coutts, and presented to the station of the Royal National Lifeboat Institution at Margate.

Designed and lent by Mr. George Turner, Master Shipwright, Woolwich Dockyard.

139. Life boat, length, 36 ft., breadth 7 ft. 10 in.

Designed and lent by Mr. George Turner, Master Shipwright, Woolwich Dockyard.

140. Corvette of the "ALABAMA" class.

Proposed and lent by Mr. George Turner, Master Shipwright, Woolwich Dockyard.

141. Armour-plated corvette, length 210 ft.

Proposed and lent by Mr. George Turner, Master Shipwright, Woolwich Dockyard.

142. Life boat, length 26 ft.

Proposed and lent by Mr. George Turner, Master Shipwright, Woolwich Dockyard.

143. Bombay pleasure boat, length 47 ft. breadth 12 ft. Not built.

Lent by Mr. George Turner, Master Shipwright, Woolwich Dockyard.

144. Bombay fishing boat, "LUXMEE," length 47 ft., breadth 12 ft. Native design, built at Bombay in 1845.

Lent by Mr. George Turner.

145. HALF MODEL of the "GOLCONDA," (screw), 400 horse-power, launched 2nd December 1863 by the Thames Iron Works Company, length (register) 314 ft. 3 in., breadth 38 ft. 3 in., depth 26 ft. 6 in., tonnage 1,909; engines (Wolf's double cylinder) by Messrs. Humphreys & Tennant.

Presented by the Peninsular and Oriental Company.

146. HALF MODEL of the "NYANZA," (paddle), 450 horse-power, launched 3rd November 1864 by the Thames Iron Works Company length (register) 327 ft. 3 in., breadth 36 ft. 2 in., depth 27 ft. 6 in., tonnage 2,082; engines (oscillating) by Mr. H. G. Rennie.

Presented by the Peninsular and Oriental Company.

147. MODEL of H.M.S. "RACoon," (on a $\frac{3}{16}$ -in. scale), 22 guns, 400 horse-power.

(For description, see No. 337, Class I., Admiralty Models.)

Lent by H.R.H. Prince Alfred.

148, 149. Two MODELS of vessels illustrating a new method of rigging ships with flat-surface sails.

Proposed and lent by Lieut. W. Congalton, R.N.R.

150. Propeller for shallow water.

Two horizontal oscillating steam cylinders put a crank shaft, lying across the hull, in motion. The crank shaft is three-throw, that is to say, it has a crank at each end and one in the centre. This central crank carries a strong connecting rod, which puts a piston in motion within a third or vacuum cylinder, which is employed to equalize the work done throughout any revolution. To the centre of the length of the connecting rod, or thereabouts, a really simple but apparently complex apparatus is fitted, which gives an oar-like motion to disc propellers, one at either side of the ship.

Proposed and lent by Mr. John Garrod White, Ipswich. 1864.

151, 152. Two specimens of patent grooves and metal sheathing for iron ships.

Presented by Mr. T. B. Daft, C.E.

153. Model of the "NORTHUMBERLAND," (iron), 26 guns, 1,350 horse-power, screw, rigged, (on a $\frac{1}{2}$ -in. scale,) length 400 ft, breadth 59 ft. $3\frac{1}{2}$ in., depth 21 ft. 1 in., tonnage 6,621. Building now (1865) by contract at Millwall, by the Millwall Iron Works and Shipbuilding Company. She was commenced by Messrs. C. J. Mare & Co., at their Yard at Millwall in October 1861.

Designed by the Controller's Department.

There are also building on the same lines the "MINOTAUR" and "AGINCOURT."

The armament is—

	No.		Prs.	
Main deck	- { 4	-	300	- 12-ton guns.
	- { 18	-	100	- 6 $\frac{1}{2}$ "
Upper "	- 4	-	100	- 6 $\frac{1}{2}$ "
	<hr/>			
	26			

This MODEL, showing three masts and 50 guns, was made before the masting and armament of the ship had been decided on. The ship now has five masts and 26 guns.

Lent by the Millwall Iron Works Company.

154. A MODEL (on a $\frac{1}{4}$ -inch scale), of the same ship as the preceding.

155. MODEL of Woodside ferry boat "CHESHIRE," employed between Birkenhead and Liverpool, licensed to carry 1,620 passengers, draught of water 6 ft.

Designed by Mr. George Harrison, M.I.C.E.

Lent by the Millwall Iron Works Company.

156, 157, 158. Three MODELS, illustrating the "double-ended principle" in ship building; and one sectional MODEL of an "after end," fitted with nautilus propellers, patented by Mr. Kennedy, 28th October 1863.

The largest of these MODELS, which was the first made, dates back to March 1862, and was placed in the Museum of Patents in September 1862. The last one placed there was made for the drawings prepared for the patent. The novel points consist in the new form of bottom, propellers, rudders, battery, &c. The propellers are also the subject of a patent, dated May 1862.

Presented by Mr. John Kennedy, Whitehaven.

159. MODEL of an ice boat, such as is employed on the Gulf of Finland, the Canadian lakes, &c. The length of the Sokol (Falcon) is about 25 ft., and at her widest part, where the mast rises, she is 12 ft. broad.

Presented by Mr. John S. Anderson.

160. MODEL of a Thames sailing barge, 1855. Length 70 ft., breadth 16 ft., depth 6 ft.

Built and lent by Searle & Sons, Lambeth.

161. MODEL of the eight-oared "outrigger" built for the Cambridge University crew in 1860. Length 58 ft., breadth 2 ft. 2 in., depth 1 ft. 1½ in.

Built and lent by Searle & Sons, Lambeth.

162. MODEL of the last State Barge built in 1807 for the Lord Mayors (on 1-in. scale) of London.

Built and lent by Searle & Sons, Lambeth.

163. MODEL of a design for an armour-plated war vessel, on the turret principle. Submitted to the Admiralty in 1862. Length 365 ft., breadth 60 ft., tons 6,300, horse power 1,160, speed 15 knots, guns 22.

Lent by Messrs. Westwood & Baillie, Isle of Dogs, Poplar.

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For Her Majesty's Stationery Office,

[4380.—{ 500. }—7/65.]

APPENDIX
TO THE
CATALOGUE OF NAVAL MODELS
IN THE
SOUTH KENSINGTON MUSEUM,
WITH
TABLE OF CONTENTS
AND
INDEX TO THE WHOLE CATALOGUE.



LONDON :
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1869.



CATALOGUE OF RECENT WORKS

FOR THE YEAR 1881



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APPENDIX

TO

CATALOGUE OF NAVAL MODELS.

CLASS I.*

Models representing the Lines and Forms of Ships of the Royal Navy, from its Commencement to the present Time, arranged according to their Dates and Classes.

DIVISION A.—WHOLE MODELS of SHIPS arranged as follows, viz. :—

1st. Line-of-battle ships of 3 decks.	9th. Iron-cased ships, 3d class.
2nd. " " " 2 "	10th. " " 2nd class.
3rd. Frigates.	11th. " " 1st class.
4th. Corvettes, sloops, &c.	12th. Turret ships.
5th. Gun vessels.	13th. Iron-cased ships. Designs proposed, but not adopted.
6th. Gun boats.	14th. Miscellaneous.
7th. Paddle-wheel despatch vessels.	
8th. Troop-ships.	

DIVISION B.—HALF MODELS of SHIPS arranged as in Division A.

DIVISION C.—MODELS of BOWS of SHIPS arranged as in Division A.

DIVISION D.—MODELS of MIDSHIP SECTIONS of SHIPS arranged as in Division A.

DIVISION E.—MODELS of STERNS of SHIPS arranged as in Division A.

* In the particulars of the vessels represented in this class, unless otherwise stated, the length given is the length between the perpendiculars, the breadth is the breadth extreme, the tonnage is builders' measurement (old rule); the armament stated against the ships is that which was ordered for them about the time of their being launched, but in many cases it has been frequently altered since.

When a ship has been tried fully rigged and equipped for sea, the corresponding speed and draught of water is that which has been stated; in the case of those ships which have not been so tried, the correct speed and draught of water have been given as far as practicable.

CLASS I.—DIVISION A.

Whole Models, representing the Lines and Forms of Ships of the Royal Navy, from its Commencement to the present Time, arranged according to their Dates and Classes.

CORVETTES, SLOOPS, &c.

119. The "AMAZON," 4 guns, 300 horse-power (on a $\frac{1}{8}$ -inch scale), length 187 ft., breadth 36 ft., draught of water 13 ft. 5 $\frac{1}{2}$ in. forward, 16 ft. 5 in. aft, tonnage 1,081, speed 12.396. Laid down at Pembroke Yard in July 1864, launched in May 1865, sunk in the Channel by collision with another ship 10th July 1866.

Designed by the Controller's Department.

There were also built on the same lines the "VESTAL" at Pembroke in 1865, the "NIOBE" at Deptford in 1866, the "NYMPHE" at Deptford in 1866, the "DRYAD" at Devonport in 1866, and the "DAPHNE" at Pembroke in 1866.

The armament was as follows, viz.:

No.	Prs.	Weight.
		tons.
2 rifled -	—	6
2 -	64	—
Total -	4	—

The complement of men was 130.

A whole model of this ship, on a $\frac{1}{4}$ -inch scale, will be found in the Catalogue at Class I., Division A., No. 118, page 49; also a half model in the Appendix, at Class I., Division B., No. 345, page 22.

The "BLANCHE" class were built on similar lines to the "AMAZON," but lengthened 25 ft. amidships, and the bow slightly altered. See Appendix, Class I., Division B., No. 346, page 23.

120. The "STAUNCH," twin-screw end-on gun boat for harbour defence, built of wood, to carry one 300-pr. 12-ton gun, 25 horse-power (on a $\frac{1}{4}$ -inch scale).

Length	-	-	-	-	ft.	ins.
Breadth	-	-	-	-	75	0
Draught of water, forward	-	-	-	-	25	0
" " aft	-	-	-	-	5	10
					6	6

Combined nominal power of two pair of twin-screw engines, 25 horse-power; tonnage, 200, speed 7.654 knots. No armour, but built with the idea that being so small, and fighting bow on, she would be difficult to hit. Laid down in June 1867, launched in December 1867. Built by Messrs. C. Mitchell & Co., Newcastle-on-Tyne.

Designed by Mr. George W. Rendel, of the Elswick Ironworks, Newcastle.

A half block model of this ship will be found at Class I., Division B., No. 365*, page 29, in the Appendix.

WHOLE MODELS.—SHOT-PROOF SHIPS, AFLOAT OR BUILDING.

157. The "VIPER," built of iron, twin screw, 2 guns, 160 horse-power (on a $\frac{1}{4}$ -inch scale), length 160 ft., breadth 32 ft., draught of water 10 ft. 5½ in. forward, 11 ft. 5½ in. aft, tonnage 737, displacement 1,072 tons, speed 8.9 knots, area of midship section immersed 309 square feet. Built by contract in the River Thames by Messrs. J. & W. Dudgeon. Laid down in June 1864, launched in December 1865.

Designed by Controller's Department.

There was also built on the same lines the "VIXEN," in the River Thames, by Mr. C. Lungle in 1865.

The armament was two 6-ton rifled guns.

The complement of men was 80.

A half-block model of this ship will be found in the Appendix, at Class I., Division B., No. 405, page 36.

SHOT-PROOF SHIPS.—DESIGNS PROPOSED BUT NOT ADOPTED.

179. Design for an armour-plated twin-screw ship.

Proposed by Mr. W. V. Miller, Paymaster, Royal Navy, in 1865.

180. Design for an armour-plated ship-of-war with five batteries, to fire all her guns almost end on.

Proposed by Mr. G. A. Braxton in 1865.

181. Design for a ship-of-war, the peculiar form of the sides of which it was intended should render it shot proof.

Proposed by Mr. William Durand. 1865.

182. MODEL of a plan for the construction of iron-cased floating batteries in a "star-like" form, with four or more arms, and of a breadth exceeding that of the waves to which she is to be exposed, whereby it was supposed that extraordinary buoyancy would be obtained, and also that the vessel would roll less.

Proposed by Mr. J. Moody. 1866.

183. MODEL (on a scale of $3\frac{1}{2}$ inches to 20 feet) of a design for a steam ram, length 280 ft., breadth 40 ft. To be armed with two 350-pounder Mackay guns. The vessel is also designed to be propelled by a new form of paddle-wheel, with floats of the shape shown in the model.

Proposed by Major J. Scott Phillips. 1865.

184. MODEL of a design for a steam ram and propeller similar to that described in the preceding Model (No. 183).

Proposed by Major J. Scott Phillips. 1867.

185*. Design for a sea-going iron-cased twin screw turret ship, 4 guns, 800 horse-power (on a $\frac{1}{4}$ -in. scale), length 300 ft., breadth 50 ft., draught of water 23 ft., tonnage 3,590, displacement 6,012 tons, speed 13.5 knots (estimated).

The armament to be four 600-pounder guns, in two turrets.

The complement of men to be 450.

Proposed by Messrs. Samuda Brothers. 1867.

This model, and the three others at Nos. 376, 377, and 378, Class I., Division B., pages 47 and 48 of the Appendix, represent four designs for iron-cased ships, which were prepared in compliance with a letter from the Admiralty in May 1867 to certain shipbuilding firms inviting them to send in competitive plans for an iron-cased ship of from 3,500 to 3,800 tons, to be either on the turret or broadside principle, at the option of the Designer.

For further particulars in regard to these designs, see Parliamentary Paper dated 3d December 1867, No. 26.

186*. Rough MODEL of the Atkin ram.

The proposal was as follows:

The vessel to be employed wholly as a ram, carrying no guns; to be moved wholly by steam-power, having neither masts, sails, nor rigging; the athwartship sections of the bottom and sides to be circular; the deck to be arched over as shown in the model. A ram, as shown in model, to be formed at each end to avoid the necessity of turning. To have four screw-propellers driven by separate engines; the rudders to be placed entirely below water. Length 104 ft., tonnage 300.

Proposed by Mr. Robert Atkin, 1867.

187*. Plan of shot-proof ship, with certain peculiarities of construction.

Proposed by Mr. George Kirkley.

The model will be found in the Appendix, at Class IV., Division O., No. 282, page 55.

188*. MODEL of a gun boat on "Hyde's deflecting principle."

The proposal is to construct war ships with deflecting sides below the water as well as above, and thus make them secure from shot; the acuteness of the angle at which the side of the ship is to be constructed is intended to cause the shot to pass off without penetration. The teak backing is dispensed with as an internal support, and is placed vertically on the outside of the plates and secured thereto. This external application of vertical plank is intended to receive the first impact of the shot and alter its line of flight before contact with the armour plate is effected, and thus decrease the angle of deflection. Mr. Hyde considers this plan of applying the teak will admit of quick repair when gouged by shot.

By this system the armour plating being distributed over a large surface, Mr. Hyde thinks it will cause less strain to a ship than when placed on a vertical side.

As regards the action of the sea on the sponsoned side of a deflecting ship, the centres he thinks may be so arranged as to ease any defect from this source, should it exist. The angular sides being so low in the water are expected to balance each other, or the sponsoned sides may be filled in with timber in vertical blocks so as to be easily repaired when injured in action.

The dimensions of the proposed ship would be as follows:

Extreme length	-	200	ft.
Length at water-line	-	180	"
Extreme breadth	-	54	"
Breadth at water-line	-	43.1	"
Displacement at 10 ft.	-	1,840	tons.

Proposed by Mr. J. M. Hyde, Greenwich. 1866.

(See also Class IV., Division Q, No. 421, Appendix, page 60.)

189*. Design for a ship to be rendered shot proof by having the sides at the water-line project some 6 ft. or 8 ft., this extra breadth to be divided into compartments and filled with tow, cork, or some such material.

Proposed by Mr. Edward James Julian, 1867.

WHOLE MODELS.—MISCELLANEOUS.

199. A set of MODELS (*a. b. and c.*) intended to illustrate a system of constructing ships; (*a.*) is a set of sections showing how one figure may be derived from another by elongation, the second form having the same sections as the first, but the distance between the sections being increased; (*b.*) is a conical figure which may be supposed to be derived from a shorter cone of the same base; (*c.*) is the form which the inventor recommends for ships' bottoms; it is a prolate spheroid, and it may be considered as derived by elongation from the sphere, which, according to the inventor, is a perfect figure.

Proposed by Mr. Thos. Pounds, R.N., 1865.

CLASS I.—DIVISION B.

Half-Models of Ships, arranged according to their Dates and Classes.

LINE-OF-BATTLE SHIPS OF TWO DECKS.

238. The "COLOSSUS," 80 guns, 400 horse-power (on a $\frac{1}{4}$ inch scale), length 190 ft., breadth 57 ft., draught of water 23 ft. 2 in. forward, 25 ft. 7 in. aft, tonnage 2,590, speed 9.31 knots. Laid down at Pembroke Dockyard, October 1843, at

sailing ship, and launched as such June 1848. Converted for the screw-propeller at Portsmouth Dockyard in 1854 without any alteration in her form, as were also the following ships, which were built on the same lines, viz., the "MAJESTIC," at Chatham, in 1853; the "BRUNSWICK," at Pembroke, in 1855; the "CENTURION," at Devonport, in 1856; the "MARS," at Chatham, in 1856; the "GOLIATH," at Chatham, in 1858; the "MEEANEE," at Sheerness, in 1858, the "IRRESISTIBLE," at Chatham, in 1859; the "LION," at Devonport, in 1859; the "COLLINGWOOD," at Sheerness, in 1861. The "COLOSSUS" was sold in 1867.

Designed as a sailing ship by Sir William Symonds, and adapted for the screw by the Surveyor's Department.

The armament was as follows:

	No.	Prs.	Weight.		Length.	
			cwt.	ft.	in.	
Lower deck	10	8-in.	65	9	0	
	18	32-prs.	56	9	6	
Main "	4	8-in.	65	9	0	
	24	32-prs.	50	9	0	
Upper "	24	32 "	42	8	0	
80						

The complement of men was 750.

239. The "NEPTUNE," 90 guns, 500 horse-power (on a $\frac{1}{4}$ inch scale), length 216 ft. 6 in., breadth 55 ft. 5 in., draught of water 23 ft. 6 in. forward, 26 ft. 5 in. aft, tonnage 2,830, speed 10.897 knots. Laid down at Portsmouth Dockyard in January 1827, as a sailing ship; launched as such in September 1832; converted for the screw-propeller in 1859.

Designed by Sir William Rule as a sailing ship, and adapted for the screw by the Surveyor's Department.

There were also built on the same lines, and converted for the screw in a similar manner, the "ST. GEORGE," at Devonport in 1859; the "TRAFALGAR," at Chatham in 1859; the "CONQUEROR," at Sheerness in 1859; and the "ROYAL WILLIAM," at Devonport in 1860.

The armament was as follows :

	No.		Prs.		Weight.		Length.
					cwt.		ft. in.
Lower deck	- 32	-	8-in.	-	65	-	9 0
Main „	- 34	-	32-prs.	-	56	-	9 6
Upper „	- { 22	-	32 „	-	42	-	8 0
	- { 2	-	68 „	-	95	-	10 0
	<hr/>						
	90						

The complement of men was 860.

240. The “RODNEY,” 90 guns, 500 horse-power (on a $\frac{1}{4}$ -inch scale), length 214 ft. 4 in., breadth 54 ft., draught of water 18 ft. 9 in. forward, 21 ft. 6 in. aft, tonnage 2,770, speed 11.479 knots (ship light). Laid down at Pembroke Yard in July 1827, as a sailing ship; launched as such in June 1833; converted for the screw-propeller in 1859.

Designed by Sir Robert Seppings as a sailing ship, and adapted for the screw-propeller by the Surveyor's Department.

There were also built on the same lines, as sailing ships, the “LONDON” and the “NILE;” the former was altered to a steam ship at Devonport in 1858, in the same manner as the “RODNEY;” but the “NILE” was converted at Devonport in 1854, without being lengthened.

The armament was as follows :

	No.		Prs.		Weight.		Length.
					cwt.		ft. in.
Lower deck	- 32	-	8-in.	-	65	-	9 0
Main „	- 34	-	32-prs.	-	56	-	9 6
Upper „	- { 22	-	32 „	-	42	-	8 0
	- { 2	-	68 „	-	95	-	10 0
	<hr/>						
	90						

The complement of men was 840.

241. The “QUEEN,” 86 guns, 500 horse-power (on a $\frac{1}{4}$ -inch scale), length 216 ft. 7 $\frac{1}{2}$ in., breadth 60 ft. 0 $\frac{1}{4}$ in., tonnage 3,249, draught of water 22 ft. forward, 23 ft. 7 in. aft, speed 10.578 knots. Launched in 1839 as a sailing ship. Commenced cutting down and conversion to a screw ship at Sheerness Yard in August 1858, and launched as such in April 1859.

The alteration of her lines for a steam ship was by the Surveyor's Department.

There was also built as a sailing ship, on the same lines, the "FREDERICK WILLIAM," which was converted for the screw propeller in the same manner at Portsmouth in 1860.

The armament was as follows, viz.:

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower deck	30	8-in.	65	9 0
Main "	32	32-prs.	56	9 6
Upper "	22	32 "	42	8 0
	2	68 "	95	10 0
	36			

The complement of men was 845.

The above model and dimensions represent the ship as converted for the screw, but a model of her as a sailing ship, and her dimensions as such, will be found in the Catalogue at Class I., Division A., No. 23, page 33, and at Division B., No. 205, page 57.

242. The "ALBION," 90 guns, 400 horse-power (on a $\frac{1}{4}$ -inch scale), length 204 ft. 4 in., breadth 60 ft. 3 in., draught of water 18 ft. 9 in. forward, 21 ft. 6 in. aft., tonnage 3,111, speed 10.986 knots (ship light). Laid down at Devonport Yard 13th August 1839, as a sailing vessel, and launched as such 6th September 1842. She was converted for the screw propeller at Devonport in 1861, without any alteration in her form, as were also the following ships, which were built on the same lines, viz., the "EXMOUTH," at Devonport in 1854, and the "ABOUKIR" at Devonport in 1858.

Designed for a sailing ship by Sir William Symonds, and adapted for the screw propeller by the Controller's Department.

The armament was as follows, viz.:

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Low deck	32	8-in.	65	9 0
Main "	32	32-prs.	56	9 6
Upper "	26	32 "	42	8 0
	90			

The complement of men was 820.

243. The "SANS PAREIL," 80 guns, 350 horse-power (on a $\frac{1}{4}$ inch scale), length 200 ft., breadth 52 ft. 3 in., depth 22 ft. 8 in., tonnage 2,339. Laid down at Devonport Yard in September 1845 as a sailing ship. Conversion to a screw ship commenced in January 1849; launched as such in March 1851. Sold in 1867.

Designed by Sir Wm. Symonds as a sailing ship, and adapted for the screw, by the Surveyor's Department.

The armament was as follows:

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Lower deck -	30	- 32	- 56	- 9 6
Main " -	30	- 8-in.	- 52	- 8 0
Upper " -	18	- 32-prs.	- 25	- 6 0
" " -	2	- 32 "	- 56	- 9 6
	<u>80</u>			

The complement of men was 700.

The model and the above dimensions represent the ship as she was actually built, but a model of her as a sailing ship will be found in the Catalogue at Class I., Division B., No. 223, page 62, and another model of her as a steam ship at No. 229, page 64.

HALF-BLOCK MODELS—FRIGATES

295. The "SHANNON," 51 guns, 600 horse-power (on a $\frac{1}{4}$ inch scale), length 235 ft. 1 in., breadth 50 ft. 1 $\frac{1}{2}$ in., draught of water 20 ft. 3 in. forward, 21 ft. 9 in. aft, tonnage 2,667, speed 11.492 knots (ship light). Laid down at Portsmouth Dockyard in January 1854; launched in November 1855.

Designed by Surveyor's Department.

There were also built on the same lines the "LIFFEY" at Devonport in 1856, the "TOPAZE" at Devonport in 1858, the "BACCHANTE" at Portsmouth in 1859, and the "LIVERPOOL" at Devonport in 1860.

The armament was as follows, viz.:

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck -	30	8-in.	65	9 0
Upper „ -	{ 20	32-prs.	56	9 6
	{ 1	68 pivot	95	10 0
	51			

The complement of men was 560.

296. The "PHAËTON," 51 guns, 400 horse-power (on a $\frac{1}{4}$ -inch scale), length 220 ft. 3 $\frac{3}{8}$ in., breadth 49 ft. 10 in., draught of water 10 ft. 9 in. forward, 21 ft. aft, tonnage 2,396, speed 10·466 knots (ship light); launched in 1848 as a sailing ship. Commenced conversion to a screw ship at Sheerness Yard on 15th April 1859, and undocked as such on 12th December 1859.

The alteration of her lines to a steam ship was by the Surveyor's Department.

The armament was as follows, viz.:

(on draught speed yard)	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck -	{ 8	8-in.	65	9 0
	{ 22	32-prs.	56	9 6
	{ 2	8-in.	65	9 0
Her Upper „ -	{ 18	32-prs.	45	8 6
	{ 1	68 pivot	95	10 0
Main	51			
Upp				

The complement of men was 540.

The model and the above dimensions represent the ship as converted for the screw, but a model of her as a sailing ship, and her dimensions as such, will be found at Class I., Division B., No 275, page 76 in the Catalogue.

297. The "PHŒBE," 51 guns, 500 horse-power (on a $\frac{1}{4}$ -inch scale), length 240 ft. 6 in., breadth 51 ft. 9 $\frac{1}{2}$ in., draught of water 16 ft. 7 in. forward, 19 ft. 4 in. aft, tonnage 2,896, speed 11·925 knots (ship light). Laid down at Devonport Dockyard in August 1848 as a sailing ship, and launched as such in September 1854. Converted for the screw propeller in 1859.

Designed by Mr. Edye as a sailing ship, and altered for the screw propeller by the Surveyor's Department.

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	- { 8	- 8-in.	- 65	- 9 0
	- { 22	- 32-pr.	- 56	- 9 6
	- { 2	- 8-in.	- 65	- 9 0
Upper „	- { 18	- 32-pr.	- 45	- 8 6
	- { 1	- 68 pivot	- 95	- 10 0
	<hr/> 51			

The complement of men was 525.

The “INDEFATIGABLE” was built as a sailing ship on the same lines as the “PHŒBE” before her conversion, and a model of her will be found at Class I., Division B., No. 277, page 77 in the Catalogue.

298. The “NARCISSUS,” 51 guns, 400 horse-power (on a $\frac{1}{4}$ -inch scale), length 228 ft., breadth 51 ft. 3 in., draught of water 20 ft. 3 in. forward, 23 ft. 9 in. aft, tonnage 2,665, speed 10·597 knots. Laid down at Devonport Yard in April 1857; launched in October 1859.

Designed by Surveyor's Department

The armament was as follows :

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	- { 8	- 8-in.	- 65	- 9 0
	- { 22	- 32-pr.	- 56	- 9 6
	- { 2	- 8-in.	- 65	- 9 0
Upper „	- { 18	- 32-pr.	- 45	- 8 6
	- { 1	- 68 pivot	- 95	- 10 0
	<hr/> 51			

The complement of men was 540.

299. The “OCTAVIA,” 51 guns, 500 horse-power (on a $\frac{1}{4}$ -inch scale), length 252 ft. 5 in., breadth 52 ft. 10 in., draught of water 20 ft. 10 in. forward, 23 ft. 10 in. aft, tonnage 3,161, speed 11·538 knots. Laid down at Pembroke Dockyard in September 1846 as a sailing ship, launched as such in August 1849. Converted for the screw propeller at Portsmouth Dockyard in 1860.

Designed by Sir William Symonds as a sailing ship, and altered for the screw propeller by the Surveyor's Department.

There were also built on the same lines as sailing vessels, and converted to steam ships in a similar manner, the "ARETHUSA" at Chatham in 1861, and the "CONSTANCE" at Devonport in 1862.

The armament was as follows:

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	- { 8	- 8-in.	- 65	- 9 0
	- { 22	- 32-pr.	- 56	- 9 6
	- { 2	- 8-in.	- 65	- 9 0
Upper „	- { 18	- 32-pr.	- 45	- 8 6
	- { 1	- 68 „ pivot	95	- 10 0
	<hr/> 51			

The complement of men was 525.

Models of the ships of this class launched as sailing ships will be found at Class I., Division B., Nos. 273 and 278, pages 75 and 77 in the Catalogue.

300*. The "INCONSTANT," 16 guns, 1,000 horse-power (on a $\frac{1}{4}$ -inch scale), length 333 ft., breadth 50 ft. 1 in., draught of water forward 22 ft., aft 24 ft., tonnage 4,066, speed 15 knots (estimated). Laid down at Pembroke Dockyard in November 1866; launched in November 1868.

Designed by the Controller's Department.

Her armament is intended to be:

	No.	Calibre.	Weight.
Main deck	- 10	- 9 in. rifled M. L.	- 12 $\frac{1}{2}$ tons.
Upper „	- 6	- 7 „	- 6 $\frac{1}{2}$ „

16

Her complement will be 600 men.

HALF-BLOCK MODELS.—CORVETTES, SLOOPS, &c.

339. The "RIFLEMAN," 6 guns, 100 horse-power (on a $\frac{1}{4}$ -inch scale), length 150 ft., breadth 26 ft. 7 in., draught of water 11 ft. 3 in. forward, 11 ft. 10 in. aft, tonnage 486, speed 7.15 knots. Laid down at Portsmouth Dockyard in July 1845. Undocked August 1846.

Designed by Mr. Fincham.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
1 - - - 56 - - -		87 - - -	10 0
1 - - - 10-in. - - -		85 - - -	9 4
4 - - - 32-pr. - - -		25 - - -	6 0
<hr/>			
6			

The complement of men was 80.

340. The "MALACCA," 17 guns, 200 horse-power (on a $\frac{1}{4}$ -inch scale), length 192 ft., breadth 34 ft. 4 in., draught of water 15 ft. 10 in. forward, 18 ft. aft., tonnage 1,034, speed 9.519 knots. Laid down at Moulmein in May 1849; launched in April 1853.

Designed by Surveyor's Department.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
16 - - - 32 - - -		32 - - -	6 6
1 - - - 10 in. - - -		85 - - -	9 4
<hr/>			
17			

The complement of men was 180.

341. The "GANNET" 11 guns, 150 horse-power (on a $\frac{1}{4}$ -inch scale), length 151 ft., breadth 29 ft. 11½ in., draught of water 13 ft. 8 in. forward, 14 ft. 3 in. aft., tonnage 579, speed 9.928 knots. Laid down at Pembroke Yard in December 1856, launched in December 1857.

Designed by Surveyor's Department.

There were also built on the same lines the "CORDELIA" at Pembroke in 1856, the "RACER," at Deptford in 1857, the "ICARUS" at Deptford in 1858, the "PANTALOO," at Devonport in 1860.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
10 - - - 32 - - -		25 - - -	6 0
1 - - - 32 pivot - - -		58 - - -	9 6
<hr/>			
11			

The complement of men was 120.

342. The "GREYHOUND," 17 guns, 200 horse-power (on a $\frac{1}{4}$ -inch scale), length 172 ft. 6 in., breadth 33 ft. $2\frac{1}{2}$ in., draught of water 14 ft. forward, 15 ft. aft, tonnage 879, speed 9.177 knots. Laid down at Pembroke Dockyard in December 1856, launched in June 1859.

Designed by Surveyor's Department.

There was also built on the same lines the "MUTINE," at Deptford in 1859.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
16 -	- 32 -	- 32 -	- 6 6
1 -	- 32 pivot -	- 58 -	- 9 6
<hr/>			
17			

The complement of men was 165.

343. The "ROSARIO," 11 guns, 150 horse-power (on a $\frac{1}{4}$ -inch scale), length 160 ft. 1 in., breadth 30 ft. $4\frac{1}{2}$ in., draught of water 12 ft. 8 in. forward, 13 ft. 10 in. aft, tonnage 673, speed 8.913 knots. Laid down at Deptford Yard in June 1859, launched in October 1860.

Designed by Surveyor's Department.

There were also built on the same lines the "PETEREL," at Devonport in 1860, the "RAPID," at Deptford in 1860, the "ROYALIST," at Devonport in 1861, the "SHEARWATER," at Pembroke in 1861, the "COLUMBINE," at Deptford in 1862, the "AFRICA," afterwards called the "CHINA," at Devonport in 1862.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
10 -	- 32 -	- 30 -	- 6 4
1 -	- 32 pivot -	- 58 -	- 9 6
<hr/>			
11			

The complement of men was 130.

344. The "WOLVERENE," 21 guns, 400 horse-power (on a $\frac{1}{4}$ -inch scale), length 225 ft., breadth 40 ft. 9 in., draught of water 17 ft. 11 in. forward, 20 ft. 4 in. aft, tonnage 1,703, speed 11.256 knots. Laid down at Woolwich Dockyard in April 1859, launched in August 1863.

Designed by the Surveyor's Department.

There were also built on the same lines the "JASON," at Devonport in 1859, the "BARROSA," at Woolwich in 1860, the "ORPHEUS," at Chatham in 1860, the "ORESTES," at Sheerness in 1860, and the "RATTLESNAKE," at Chatham in 1861.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwts.	ft. in.
16	8 in.	60	8 10
4	40-pr. Armstrong	28	8 0
1	110-pr. Armstrong	82	10 0
21			

The complement of men was 275.

345. The "AMAZON," 4 guns 300 horse-power (on a $\frac{1}{4}$ -inch scale), length 187 ft., breadth 36 ft., draught of water 13 ft. 5 $\frac{1}{2}$ in. forward, 16 ft. 5 in. aft, tonnage 1,081, speed 12.396. Laid down at Pembroke Yard in July 1864, launched in May 1865, sunk in the Channel by collision with another ship 10th July 1866.

Designed by the Controller's Department.

There were also built on the same lines the "VESTAL," at Pembroke in 1865, the "NIOBE" at Deptford in 1866, the "NYMPHE" at Deptford, in 1866, the "DRYAD" at Devonport in 1866, and the "DAPHNE" at Pembroke in 1866.

The armament was as follows, viz.:

No.	
2	6-ton guns, rifled.
2	64-pr. guns, rifled.
4	

The complement of men was 130.

A whole model of this ship (on a $\frac{1}{4}$ -inch scale) will be found in the Catalogue at Class I., Division A., No. 118, page 49, and on an $\frac{1}{8}$ -inch scale in the Appendix at Class I., Division A., No. 119, page 8.

The "BLANCHE" class were built on similar lines to the "AMAZON," but lengthened 25 ft. amidships, and the bow slightly altered. (See Appendix Class I., Division B., No. 346, page 23.)

346. The "BLANCHE," 4 guns, 350 horse-power (on a $\frac{1}{4}$ -inch scale), length 212 ft., breadth 36 ft., draught of water 13 ft. 6 in. forward, 16 ft. 6 in. aft, tonnage 1,268, speed 13·631 knots. Laid down at Chatham Yard in June 1865, launched August 1867.

Designed by the Controller's Department.

There were also built on the same lines, and likewise launched in 1867, the "DANAË" at Portsmouth, and the "ECLIPSE" (first called "SAPPHO") at Sheerness; and there are also the "SIRIUS," "SPARTAN," "DIDO," and "TENEDOS," now (1868) building on the same lines.

The armament was as follows:

Two $6\frac{1}{2}$ -ton guns, and two 64-prs.

The complement of men was 110.

The "BLANCHE" class are on similar lines to the "AMAZON" class, but lengthened 25 ft. amidships, and the bow slightly altered. (*See* Appendix, Class I., Division B., No. 345, page 22.)

The "BRITON" class is on similar lines to the "BLANCHE" class, but lengthened 8 ft. (*See* Appendix, Class I., Division B., No. 347, page 23.)

347. The "BRITON," 10 guns, 350 horse-power (on a $\frac{1}{4}$ -inch scale), length 220 ft., breadth 36 ft., draught of water 13 ft. 9 in. forward, 16 ft. 9 in. aft, tonnage 1,322, speed 12·4 knots (estimated). Laid down at Sheerness Yard in 1868.

Designed by the Controller's Department.

There was also built on the same lines the "DRUID," at Deptford.

The armament is to be:

No.	Prs.	Weight.
2	7-in.	$6\frac{1}{2}$ tons.
8	64-pr.	
10		

The complement of men is to be 200.

This class is on similar lines to the "BLANCHE" class, but lengthened 8 ft. (*see* Appendix, Class I., Division B., No. 346, page 23.)

348. The "JUNO," 6 guns, 400 horse-power (on a $\frac{1}{4}$ -inch scale), length 200 ft., breadth 40 ft. 4 in., draught of water 15 ft. 11 in. forward, 17 ft. 4 in. aft, tonnage 1,459, speed 10.584 knots. Laid down at Deptford Yard in June 1866, and launched in November 1867.

Designed by the Controller's Department.

There is also building on the same lines the "THALIA," at Woolwich.

The armament was two $6\frac{1}{2}$ -ton revolving guns, and four 64-prs.

The complement of men was 200.

349. The "VOLAGE," 8 guns, 600 horse-power (on a $\frac{1}{4}$ -inch scale), length 270 ft., breadth 42 ft., draught 18 ft. forward, 22 ft. aft, tonnage 2,322, speed 14.625 (estimated). Built by contract at Blackwall by the Thames Ironworks and Shipbuilding Company. Laid down in September 1867; launched in February 1869.

Designed by the Controller's Department.

There was also built on the same lines the "ACTIVE," by the Thames Ironworks and Shipbuilding Company.

The armament is intended to be:

No.	Prs.	Weight.
6	7-in.	$6\frac{1}{2}$ tons.
2	64-pr. revolving	
8		

The complement of men will be 350.

HALF-BLOCK MODELS.—GUN VESSELS.

350. The "ARROW," 2 guns, 160 horse-power (on a $\frac{1}{4}$ -inch scale), length 160 ft., breadth 25 ft. 4 in., draught of water 10 ft. forward, 11 ft. 8 in. aft, tonnage 477, speed 11 knots. Built by contract by Messrs. C. J. Mare and Co., at Blackwall. Laid down in April 1854; launched in June 1854. Sold in May 1862. Designed by Surveyor's Department.

There were also built on the same lines, in the same year, the "BEAGLE," "SNAKE," and "LYNX," by the same contractor; and the "WRANGLER" and "VIPER" by Messrs. Green at Blackwall.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
2	68	95	10 0

The complement of men was 65.

351. The "WANDERER," 4 guns, 200 horse-power (on a $\frac{1}{4}$ -inch scale), length 180 ft. 11 in., breadth 28 ft. 6 in., draught of water 9 ft. 7 in. forward, 11 ft. 5 in. aft, tonnage 675, speed 10·733 knots. Built by contract at Blackwall by Messrs. Green. Laid down in May 1855; launched in November 1855. Broken up in 1866.

Designed by the Surveyor's Department.

There were also built on the same lines, about the same time, the "ALACRITY," "ASSURANCE," "COQUETTE," and nine others.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
2 -	68 pivot	95 -	10 0
2 -	32-pr.	25 -	6 0
<hr/>			
4			

The complement of men was 80.

The "STAR" class were built on similar lines to the "WANDERER" but lengthened 5 ft. by the bow. (See Appendix, Class I., Division B., No. 355, page 26.)

352. The "FLYING FISH," 6 guns, 350 horse-power (on a $\frac{1}{4}$ -inch scale), length 200 ft., breadth 30 ft. 4 $\frac{1}{2}$ in., draught 10 ft. 6 in. forward, 12 ft. 10 in. aft, tonnage 871, speed 11·832 knots. Laid down at Pembroke Yard in June 1855; launched in December 1855. Broken up in 1865.

Designed by Surveyor's Department.

There were also built on the same lines the "INTREPID" and "VICTOR," at Blackwall, by Messrs. Wigram in 1855; the "NIMROD" and "ROEBUCK," at Millwall, by Mr. Russell in 1856; and the "PIONEER," at Pembroke in 1856.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
2 -	68-pivot	95 -	10 0
4 -	32	25 -	6 0
<hr/>			
6			

The complement of men was 100.

353. The "ALGERINE," 1 gun, 80 horse-power (on a $\frac{1}{4}$ -inch scale), length 125 ft. 10 $\frac{1}{2}$ in., breadth 22 ft. 11 $\frac{1}{2}$ in., draught 8 ft. 1 in. forward, 8 ft. 2 in. aft, tonnage 299, speed 9.3 knots. Built by contract, by Mr. Pitcher, at Northfleet. Laid down in October 1856, launched in February 1857. Designed by Surveyor's Department.

There were also built on the same lines the "JASPER," at Blackwall, by Messrs. Green in 1857; the "LEVEN" and "SLANEY," by Mr. Pitcher, at Northfleet in 1857.

The armament was one 10-in. pivot gun, weighing 87 cwt., length 9 ft. 6 in.

The complement of men was 50.

354. The "RANGER," 5 guns, 80 horse-power (on a $\frac{1}{4}$ -inch scale), length 145 ft., breadth 25 ft. 4 $\frac{1}{2}$ in., draught 10 ft. 8 in. forward, 12 ft. aft, tonnage 427, speed 9.006 knots. Laid down at Deptford Yard in November 1857, launched in November 1859.

Designed by Surveyor's Department.

There were also built on the same lines, about the same time, the "CYGNET," "DART," "ESPOIR," and 16 others.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
1	68-pivot	95	10 0
4	24 howitzers.		
5			

The complement of men was 60.

355. The "STAR," 4 guns, 200 horse-power (on a $\frac{1}{4}$ -inch scale), length 185 ft. 1 $\frac{1}{2}$ in., breadth 28 ft. 4 in., draught 10 ft. 6 in. forward, 12 ft. aft, tonnage 695, speed 10.084 knots. Built by contract, at Millwall, by Messrs. C. J. Mare & Co. Laid down in June 1859, launched in December 1860. Designed by Surveyor's Department.

There were also built on the same lines, about the same time, the "CORMORANT," "ECLIPSE," "LILY," and 5 others.

The armament was as follows:

No.	Prs.	Weight.	Length.
		cwt.	ft. in.
2	68 pivot	95	10 0
2	32 „	25	6 0
4			

The complement of men was 90.

This class is on similar lines to the “WANDERER” class, but lengthened 5 ft. by the bow. (*See Appendix, Class I, Division B., No. 351, page 25.*)

356. The “PLOVER,” twin screw, 3 guns, 160 horse-power (on a $\frac{1}{4}$ -inch scale), length 170 ft., breadth 29 ft., draught 9 ft. 4 in. forward, 9 ft. 9 in. aft, tonnage 663, speed 11·339. Laid down at Deptford Yard in November 1865, launched in February 1867.

Designed by Controller's Department.

There were also built on the same lines the “PHILOMEL” at Deptford in 1867; the “BULLFINCH” at Sheerness in 1868; the “RINGDOVE” in 1867, and the “MAGPIE” in 1868, at Portsmouth; and the “LAPWING” in 1867, and the “SEAGULL” in 1868, at Devonport; and there are also building on the same lines the “CURLEW,” “WOODLARK,” “VULTURE,” “SWALLOW,” and “BITTERN.”

The armament was as follows:

No.	Prs.	Weight.
1	100	6 $\frac{1}{2}$ tons.
2	40 Armstrong.	
3		

The complement of men was 80.

357. The “FLIRT,” twin screw, 4 guns, 120 horse-power (on a $\frac{1}{4}$ -inch scale), length 155 ft., breadth 25 ft., draught 8 ft. forward, 8 ft. 8 in. aft, tonnage 464, speed 10·091 knots (ship light). Laid down at Devonport Yard in April 1867, launched December 1867.

Designed by the Controller's Department.

There were also built on the same lines, and about the same time, 7 other vessels in the Dockyards and 8 others by contract.

The armament was as follows:

1	-	6½-ton gun, revolving.	
1	-	64-pr.	- "
2	-	20 „ Armstrong	

The complement of men was 70.

HALF-BLOCK MODELS.—GUN BOATS.

361*. The "ALBACORE," 2 guns, 60 horse-power (on a ¼-inch scale), length 108 ft. 4 in., breadth 22 ft. 1 in., draught 6 ft. 10 in. forward, 6 ft. 6 in. aft, tonnage 235, speed 6·5 knots. Built by contract at West Cowes by Messrs. J. & R. White. Laid down in October 1855, launched in April 1856.

Designed by Surveyor's Department.

There were also built on the same lines, about the same time, the "AMELIA," the "BANTERER," and 113 others.

The armament was as follows:

No.		Pra.		Weight.		Length.
				cwt.		ft. in.
1	-	68	-	95	-	10 0
1	-	32	-	56	-	9 6
<hr/>						
2						

The complement of men was 36.

362*. The "CLOWN," 2 guns, 40 horse-power (on a ¼-inch scale), length 110 ft. 2½ in., breadth 21 ft. 11 in., draught 5 ft. 11 in. forward, 6 ft. 5 in. aft, tonnage 238, speed 6·4 knots. Built by contract by Mr. W. C. Miller at Liverpool. Laid down in January 1856, launched in May 1856.

Designed by Surveyor's Department.

There were also built on the same lines the "DRAKE," "FENELLA," and 9 others.

The armament was as follows:

No.		Pra.		Weight.		Length.
				cwt.		ft. in.
1	-	68-pivot		95	-	10 0
1	-	32 „	-	56	-	9 6
<hr/>						
2						

The complement of men was 36.

363*. The "ANGLER," 2 guns, 20 horse-power (on a $\frac{1}{4}$ -inch scale), length 100 ft., breadth 21 ft. 10 in., draught 5 ft. 6 in. forward, 5 ft. 6 in. aft, tonnage 212, speed 6.75 knots. Laid down at Devonport Yard in December 1855, launched in March 1856. Broken up at Haslar in 1869.

Designed by Surveyor's Department.

There were also built on the same lines, the "ANT," at Devonport in 1856, the "CHEERFUL," at Deptford in 1855, and 17 others.

The armament was two 32-prs., 56 cwt., 9 ft. 6 in. long.

The complement of men was 30.

364*. The "BRITOMART," 2 guns, 60 horse-power (on a $\frac{1}{4}$ -inch scale), length 120 ft. 1 in., breadth 22 ft. 1 in., draught 7 ft. 9 in. forward, 8 ft. 5 in. aft, tonnage 270, speed 7.9 knots. Built by contract by Messrs. J. and W. Smith at Newcastle-on-Tyne. Laid down in November 1859, launched in May 1860.

Designed by Surveyor's Department.

There were also built on the same lines, about the same time, the "COCKATRICE," "DOTEREL," "HERON," and about 10 others.

The armament was as follows, viz.:

No.		Prs.	Weight.		Length.
			cwt.		ft. in.
1	-	68 pivot	95	-	10 0
1	-	32 „	56	-	9 6
<hr/>					
2					

The complement of men was 40.

365*. The "STAUNCH," 1 gun, 25 horse-power (on a $\frac{1}{4}$ -inch scale), twin screw, end-on gunboat for harbour defence, length 75 ft., breadth 25 feet, draught 5 ft. 10 in. forward, 6 ft. 6 in. aft, tonnage 200, speed 7.654 knots. Built by contract by Messrs. Mitchell & Co., at Walker Yard, Newcastle-on-Tyne. Laid down in June 1867, launched in December 1867.

Designed by Mr. George Rendel of the Elswick Ironworks, Newcastle-on-Tyne.

The armament was one 300-pounder 12-ton gun.

A whole Model of this ship will be found at Class I., Division A., No. 120., page 9, in the Appendix.

HALF-BLOCK MODELS.—TUGS.

371*. The "TURTLE," twin-screw iron tug, 20 horse-power (on a $\frac{1}{4}$ -inch scale), length 57 ft. 7 in., breadth 11 ft. 10 $\frac{1}{2}$ in., draught 3 ft. 6 in. forward, 5 ft. 7 in. aft, tonnage 37, speed 9.2 knots (ship light). Built by contract by Messrs. J. and W. Dudgeon at Millwall. Launched in January 1864. Designed by Messrs. J. and W. Dudgeon.

There was also built on the same lines the "AFRICAN" in 1865.

The complement of men was 7.

372*. The "TRUSTY," paddle-wheel vessel, built of iron, 150 horse-power (on a $\frac{1}{4}$ -inch scale), length 129 ft. 11 in., breadth 23 ft. 1 $\frac{1}{2}$ in., draught 10 ft. 6 in. forward, 10 ft. 6 in. aft, tonnage 329, speed 11.5 knots. Built by contract by Messrs. Palmer at Jarrow. Laid down October 1865, launched in February 1866.

Designed by Messrs. Palmer, Jarrow.

The "CAMEL" was built on the same lines by Messrs. Palmer in 1866.

HALF BLOCK MODELS.—PADDLE-WHEEL DESPATCH VESSELS.

375*. The "SALAMIS," 1 gun, 250 horse-power (on a $\frac{1}{4}$ -inch scale), length 220 ft., breadth 28 ft. 2 in., draught 10 ft. 3 in. forward, 10 ft. 8 in. aft, tonnage 835, speed 13.3 knots. Laid down at Chatham Yard in August 1861, launched in May 1863.

Designed by Controller's Department.

There were also built on the same lines the "ENCHANTRESS" and "PSYCHE" at Pembroke in 1862.

The armament was one 40-pr. Armstrong, 32 cwt., length 10 ft.

The complement of men was 65.

376*. The "HELICON," 1 gun, 250 horse-power (on a $\frac{1}{4}$ -inch scale), length 220 ft., breadth 28 ft. 2 $\frac{1}{2}$ in., draught 9 ft. 11 in. forward, 10 ft. 3 in. aft, tonnage 837, speed 14.5 knots. Laid down at Portsmouth Yard in May 1861, launched in January 1865.

Designed by Mr. Reed and Controller's Department on the lines of the "SALAMIS" (see No. 375*), but altered from the midship part forward.

The armament was one 40-pr. Armstrong, 32 cwt., length 10 ft.

The complement of men was 65.

HALF BLOCK MODELS.—YACHTS.

365. The "BLACK EAGLE," paddle-wheel, 1 gun, 260 horse-power (on a $\frac{1}{4}$ -inch scale), length 168 ft., breadth 26 ft. 5 in., draught 11 ft. 4 in. forward, 11 ft. 8 in. aft, tonnage 540, speed 11'1 knots. Built by contract by Messrs. Curling & Co., Limehouse. Laid down in April 1831, launched in July 1831.

Designed by Mr. Oliver Lang, but lengthened 13 ft. at Deptford in 1843.

The MODEL and above dimensions represent the ship as she was after being lengthened.

The armament was one 18-pr., 38 cwt.

The complement of men was 40.

She was originally called the "FIREBRAND," but in February 1842 her name was changed to "BLACK EAGLE."

366. The "OSBORNE," royal yacht, paddle-wheel, 430 horse-power (on a $\frac{1}{4}$ -inch scale), length 200 ft. 1 in., breadth 33 ft., draught 14 ft. 10 in. forward, 13 ft. 8 in. aft, tonnage 1,034, speed 10'7 knots. Laid down at Pembroke Yard in 1842, launched in 1843. Broken up at Portsmouth in 1868.

Designed by Sir William Symonds.

Prior to 22d December 1854 this vessel was called the "VICTORIA AND ALBERT."

Whole models of this ship will be found at Class I., Division A., Nos. 132 and 133, page 50, in the Catalogue.

367. The "FAIRY," royal yacht, screw, 128 horse-power (on a $\frac{1}{4}$ -inch scale), length 144 ft. 8 in., breadth 21 ft. 1 $\frac{1}{2}$ in., draught 4 ft. 11 $\frac{1}{2}$ in. forward, 7 ft. 0 $\frac{1}{2}$ in. aft, tonnage 312, speed 13'229 knots. Built at Blackwall Yard by contract by Messrs. Ditchborne and Mare. Launched in 1845. Broken up at Portsmouth in 1868.

Designed by Messrs. Ditchborne and Mare.

A whole model of this ship will be found at Class I., Division A., No. 134, page 50, in the Catalogue.

368. The "ELFIN," paddle-wheel, 40 horse-power (on a $\frac{1}{4}$ -inch scale), length 103 ft. 6 in., breadth 14 ft., draught 5 ft. 3 in. forward, 5 ft. aft, tonnage 98, speed 11'4 knots. Laid down at Chatham Yard in August 1848, launched in February 1849.

Designed by Mr. W. O. Lang.

369. The "VICTORIA AND ALBERT," royal yacht, paddle-wheel, 600 horse-power (on a $\frac{1}{4}$ -inch scale), length 300 ft., breadth 40 ft. $3\frac{1}{4}$ in., draught 19 ft. 10 in. forward, 14 ft. aft, tonnage 2,345, speed 16'8 knots (ship light). Laid down at Pembroke Yard in 1854, launched in 1855.

Designed by Surveyor's Department.

For a short time while building this vessel was called the "WINDSOR CASTLE."

Whole models of this ship will be found at Class I., Division A., Nos. 136 and 137, page 50, in the Catalogue.

370*. The "INVESTIGATOR," paddle-wheel, 34 horse-power (on a $\frac{1}{4}$ -inch scale), length 120 ft. $10\frac{1}{2}$ in., breadth 16 ft. $0\frac{1}{8}$ in., draught 4 ft. 3 in. forward, 4 ft. 6 in. aft, tonnage 149, speed 9'1 knots. Laid down at Deptford Yard in June 1861, launched in November 1861.

Designed by Controller's Department.

371.** The "ALBERTA," Royal yacht, paddle-wheel, 160 horse-power (on a $\frac{1}{4}$ -inch scale), length 160 ft., breadth 22 ft. 8 in., draught 7 ft. forward, 7 ft. aft, tonnage 391, speed 15'3 knots (ship light). Laid down at Pembroke Yard in February 1863, launched in October 1863.

Designed by Controller's Department.

A whole model of this ship will be found at Class I., Division A., No. 138, page 50, in the Catalogue.

HALF BLOCK MODELS.—TROOP SHIPS.

391*. The "SIMOOM," built of iron, 8 guns, 400 horse-power (on a $\frac{1}{4}$ -inch scale), length 246 ft., breadth 41 ft., draught 15 ft. 3 in. forward, 19 ft. 2 in. aft, tonnage 1,980, speed 10'64 knots. Built by contract by Mr. Napier, at Glasgow. Laid down in October 1845, launched in May 1849.

Designed by Mr. Napier.

The armament was as follows :

No.			Prs.			Weight.
						cwt.
6	-	-	32	-	-	25
2	-	-	32	-	-	56
<hr/>						
8						

The complement of men was 174.

392*. The "MEGÆRA," built of iron, 6 guns, 350 horse-power (on a $\frac{1}{4}$ -inch scale), length 207 ft., breadth 37 ft. 10 in., tonnage 1,395, draught 14 ft. 4 in. forward, 16 ft. 6 in. aft., speed 10·861 knots. Built by contract by Messrs. Fairbairn & Co. at Millwall. Laid down August 1845, launched May 1849. Designed by Mr. Fairbairn.

The armament was six 32-prs., 25 cwt., length 6 ft.

The complement of men was 167.

393*. The "HIMALAYA," built of iron, 6 guns, 700 horse-power (on a $\frac{1}{4}$ -inch scale), length 340 ft. 5 in., breadth 46 ft. $1\frac{3}{4}$ in., draught 18 ft. 10 in. forward, 21 ft. 3 in. aft., speed 12·805 knots, tonnage 3,453. Built by Messrs. C. J. Mare & Co. at Blackwall in 1853, for the Peninsular and Oriental Company, from whom she was purchased in July 1854.

The armament was six 32-prs., 25 cwt., length 6 ft.

The complement of men was 213.

394*. The "RESOLUTE," 2 guns, built of iron, 400 horse-power (on a $\frac{1}{4}$ -inch scale), length 282 ft. $10\frac{1}{2}$ in., breadth 36 ft. $4\frac{3}{4}$ in., draught 17 ft. 3 in. forward, 17 ft. 6 in. aft., tonnage 1,793, speed 11·447 knots. Built by Mr. Laird at Birkenhead, purchased and launched in 1855.

Designed by Mr. Laird.

Her armament was two 18-pr. carronades.

Her name was changed to "ADVENTURE," in February 1857.

There was also built on the same lines the "ASSISTANCE," at Birkenhead in 1855. (*See* Catalogue, Class I., Division B, No. 390, page 97.)

395*. The "ORONTES," built of iron, 2 guns, 500 horse-power (on a $\frac{1}{4}$ -inch scale), length 300 ft. 1 in., breadth 44 ft. 8 in., tonnage 2,823, draught 22 ft. forward, 22 ft. 6 in. aft., speed 10·88 knots. Built by contract by Messrs. Laird, Brothers, at Birkenhead. Laid down July 1861, launched November 1862. Designed by Controller's Department.

There was also built on the same lines the "TAMAR," at Millwall by Messrs. Samuda in 1862.

The armament was two 40-pr. Armstrongs, 32 cwt., length 10 ft.

396*. MODEL (on a $\frac{1}{4}$ -inch scale) of a design for the class of troop ships intended to form a direct service for the transport of troops to and fro between England and India. Length 311 ft. 6 in., breadth for tonnage 49 ft., draught 21 ft., tonnage 4,525, horse-power 800.

Proposed by Messrs. R. Napier & Sons of Glasgow in 1864, but not adopted, as the transports were built on a design prepared by the Controller's Department. (See Nos. 397* to 399*.)

397*. MODEL (on a $\frac{1}{4}$ -inch scale) of a design for the class of troop ships intended to form a direct service for the transport of troops to and fro between England and India. Length 360 ft., breadth extreme 48 ft. $1\frac{3}{4}$ in., draught 21 ft., tonnage 4,059, 750 horse-power.

Proposed by the Thames Ironworks Shipbuilding Company in 1864, but not adopted, as the transports were built on a design prepared by the Department of the Controller of the Navy. (See Nos. 396* to 399*.)

398*. MODEL (on a $\frac{1}{4}$ -inch scale) of a design for the class of troop ships intended to form a direct service for the transport of troops to and fro between England and India. Length 350 ft., breadth extreme 47 ft. $1\frac{3}{4}$ in., depth in hold 23 ft. 1 in., tonnage 3,802, horse-power 800.

Proposed by Messrs. C. J. Mare & Co. in 1864, but not adopted, as the transports were built on a design prepared by the Department of the Controller of the Navy. (See Nos. 396* to 399*.)

399*. The "EUPHRATES," built of iron, 700 horse-power (on a $\frac{1}{4}$ -inch scale), one of a class of five to form a direct service for the transport of troops to and fro between England and India. Length 360 ft., breadth 49 ft., draught 19 ft. forward, 21 ft. aft, tonnage 4,206, speed 14.718 knots. Built by contract by Messrs. Laird, Brothers. Laid down in May 1865, launched November 1866.

Designed by the Controller's Department.

There were also built on the same lines, about the same time, the "JUMNA," by Messrs. Palmer, Brothers, the "MALABAR," by Messrs. Napier & Sons, the "CROCODILE," by Messrs. Wigram, and the "SERAPIS," by the Thames Iron Shipbuilding Company. The "CROCODILE" and "SERAPIS" are to run this side of the Isthmus, and the other three on the Indian side.

HALF BLOCK MODELS.—IRON-CASED SHIPS.—THIRD CLASS.

401. The "TRUSTY," built of wood, 14 guns, 150 horse-power (on a $\frac{1}{4}$ -inch scale), length 173 ft. 6 $\frac{1}{2}$ in., breadth 45 ft. 1 $\frac{3}{4}$ in., draught of water 8 ft. 4 in. forward, 8 ft. 8 in. aft, tonnage 1,538, displacement 1,640 tons, speed 4·5 knots, area of midship section immersed 379 square feet. Built by contract at Limehouse by Messrs. Wigram. Laid down in October 1854, launched May 1855, broken up in 1865 by Messrs. Castle & Beech.

Designed by Surveyor's Department after a French model sent to England.

There were also built about the same time, on the same lines, the "METEOR" and the "THUNDER," at Limehouse, by Messrs. C. J. Mare & Co., and the "GLATTON," at Limehouse, by Messrs. Green.

The armament was 14 68-prs., 95 cwt., length 10 ft.

The complement of men was 200.

These and the "EREBUS" class were the first iron-clad ships constructed for Her Majesty's Navy.

402. The "EREBUS," built of iron, 16 guns, 200 horse-power (on a $\frac{1}{4}$ -inch scale), length 186 ft. 8 $\frac{1}{2}$ in., breadth 48 ft. 6 in., draught of water 8 ft. 10 in. forward, 8 ft. 11 in. aft, tonnage 1,954, speed 5·5 knots. Built by contract at Glasgow, by Messrs. Napier. Laid down in January 1856, launched in April 1856.

Designed by Surveyor's Department after a French model sent to England.

There were also built on the same lines, about the same time, the "TERROR," at Newcastle-on-Tyne, by Messrs. Palmer, the "ÆTNA," at Chatham, and the "THUNDERBOLT," at Millwall, by Messrs. Samuda.

The armament was 16 68-prs., 95 cwt., length 10 ft.

The complement of men was 200.

A whole model of this ship will be found at Class I., Division A, No. 150, page 51 in the Catalogue.

These and the "TRUSTY" class were the first iron-clad ships constructed for Her Majesty's Navy.

403. The "RESEARCH," built of wood, 4 guns, 200 horse-power (on a $\frac{1}{4}$ -inch scale), length 195 ft., breadth 38 ft. 6 in., draught of water 12 ft. $1\frac{1}{2}$ in. forward, 14 ft. 8 in. aft., tonnage 1,253, displacement 1,680 tons, speed 10.354 knots, area of midship section immersed 430 square feet. Laid down at Pembroke Yard in September 1861 as a 17 gun screw sloop, commenced converting to an armoured ship September 1862, launched August 1863.

Designed by Mr. E. J. Reed and the Controller's Department.

The armament was:

No.
2 6 $\frac{1}{2}$ -ton guns.
2 100-pr. Somerset 6 $\frac{1}{2}$ -ton guns.

4

The complement of men was 120.

404. The "ENTERPRISE," built of wood with iron upper-works, 4 guns, 160 horse-power (on a $\frac{1}{4}$ -inch scale), length 180-ft., breadth 36 ft. 0 $\frac{1}{2}$ in., draught of water 11 ft. 10 in. forward, 15 ft. 8 in. aft., tonnage 993, displacement 1,300 tons, speed 9.944 knots, area of midship section immersed 386 square feet. Laid down at Deptford Yard in May 1862; launched in February 1864.

Designed by Mr. E. J. Reed and the Controller's Department.

The armament was as follows:

No.
2 6 $\frac{1}{2}$ -ton guns.
2 100-pounder Somerset 6 $\frac{1}{2}$ -ton guns.

4

The complement of men was 129.

A whole model of this ship will be found at Class I, Division A, No. 153, page 52 in the Catalogue.

405. The "VIPER," built of iron, twin-screw, 2 guns, 160 horse-power (on a $\frac{1}{4}$ -inch scale), length 160 ft., breadth 32 ft., draught of water 9 ft. 11 in. forward, 11 ft. 10 in. aft., tonnage 737, displacement 1,180 tons, speed 9.58 knots, area of midship section immersed 337 square feet. Built by contract in the River Thames, by Messrs. J. and W. Dudgeon. Laid down in June 1864; launched in December 1865.

Designed by Controller's Department.

HALF MODELS.—IRON-CASED SHIPS.—SECOND CLASS. 37

There was also built on the same lines the "VIXEN," composite vessel, in the River Thames, by Mr. C. Lungley, in 1865.

The armament was two 6-ton rifled guns.

The complement of men was 80.

A whole model of this ship will be found at Class I., Division A, No. 157, page 9 in the Appendix.

406. The "WATERWITCH," built of iron, 2 guns, 160 horse-power (on a $\frac{1}{4}$ -inch scale), length 162 ft., breadth 32 ft., draught of water 10 ft. 10 in. forward, 11 ft. 4 in. aft, tonnage 778, displacement 1,190 tons, speed 9.255 knots, area of midship section immersed 344 square feet. Built by contract by the Thames Iron Shipbuilding Company, in the River Thames. Laid down in November 1864; launched in June 1866.

Designed by Rear-Admiral Geo. Elliot and the Controller's Department to be propelled on the hydraulic principle.

The armament was two 6-ton rifled guns.

The complement of men was 80.

HALF BLOCK MODELS.—IRON-CASED SHIPS.—SECOND CLASS.

421. The "FAVORITE," built of wood, 10 guns, 400 horse-power (on a $\frac{1}{4}$ -inch scale), length 225 ft., breadth 46 ft. 9 $\frac{1}{2}$ in., draught of water 9 ft. 7 in. forward, 22 ft. 7 in. aft, tonnage 2,094, displacement 3,169 tons, speed 11.825 knots, area of midship section immersed 770 square feet. Laid down at Deptford Yard in August 1860, as a 22-gun screw corvette, commenced converting to an iron-cased ship in June 1862; launched in July 1864.

Designed by Mr. E. J. Reed and the Controller's Department.

The armament was as follows, viz.:

No.		Prs.		Weight.
4	- -	100	- -	120 cwt.
6	- -	110	Armstrongs.	

10

The complement of men was 200.

422. The "PALLAS," built of wood, 6 guns, 600 horse-power (on a $\frac{1}{4}$ -inch scale), length 225 ft., breadth, 50 ft., draught 18 ft. 3 in. forward, 24 ft. 1 in. aft, tonnage 2,372, displacement 3,661 tons, speed 13.058 knots, area of midship section immersed 793 square feet. Laid down at Woolwich Yard in October 1863; launched in March 1865.

Designed by Mr. E. J. Reed and the Controller's Department.

The armament was as follows, viz.:

No.		Prs.		Weight.
4	-	100	-	6½-ton guns.
2	-	110	Armstrongs.	
<u>6</u>				

The complement of men was 225.

A whole model of this ship will be found at Class I., Division A, No. 154, page 53 in the Catalogue.

423. The "PENELOPE," built of iron, 10 guns, 600 horse-power (on a $\frac{1}{4}$ -inch scale), length 260 ft., breadth 50 ft., draught 15 ft. 9 in. forward, 16 ft. 9 in. aft, tonnage 2,997, displacement 4,368 tons, speed 12.764 knots, area of midship section immersed 770 square feet. Laid down at Pembroke Yard in September 1865; launched in June 1867.

Designed by Controller's Department.

The armament was as follows, viz.:

No.		Prs.		Weight.
8	-	300	-	12-ton guns.
2	-	40	Armstrongs.	
<u>10</u>				

The complement of men was 350.

HALF BLOCK MODELS.—IRON-CASED SHIPS.—
FIRST CLASS.

431. The "WARRIOR," built of iron, 40 guns, 1,250 horse-power (on a $\frac{1}{4}$ -inch scale), length 380 feet 2 in., breadth 58 ft. 4 in., draught 25 ft. 6 in. forward, 26 ft. 5 in. aft, tonnage 6,109, displacement 8,852 tons, speed 14·356 knots, area of midship section immersed 1,219 square feet. Built by contract at Blackwall by the Thames Iron Shipbuilding Company. Laid down in May 1859; launched in December 1860.

Designed by Surveyor's Department.

There was also built on the same lines the "BLACK PRINCE," at Glasgow, by Messrs. Napier and Sons, in 1861.

The armament was as follows, viz.:

	No.	Prs.	Weight.
Main deck	34	68	95 cwt.
Upper „	$\begin{cases} 2 \\ 4 \end{cases}$	$\begin{cases} 68 \text{ pivot} \\ 40 \text{ Armstrongs.} \end{cases}$	$\begin{cases} 95 \text{ „} \end{cases}$
	40		

The complement of men was 635.

432. The "ACHILLES," built of iron, 20 guns, 1,250 horse-power (on a $\frac{1}{4}$ -inch scale), length 380 ft., breadth 58 ft. 3½ in., draught 25 ft. 11 in. forward, 26 ft. 11 in. aft, tonnage 6,121, displacement 9,487 tons, speed 14·322 knots, area of midship section immersed 1,308 square feet. Laid down at Chatham Yard in August 1861 in a dock; undocked in December 1863.

Designed by the Controller's Department on lines very similar to the "WARRIOR" and "BLACK PRINCE," built in 1860.

The armament was as follows, viz.:

Main deck	$\begin{cases} 8 \\ 8 \end{cases}$	$\begin{cases} 6\frac{1}{2}\text{-ton guns.} \\ 6\frac{1}{2}\text{-ton rifled guns.} \end{cases}$
Upper „	4	6½-ton „
	20	

The complement of men was 705.

A whole model of this ship will be found at Class I., Division A., No. 152, page 52 in the Catalogue.

433. The "DEFENCE," built of iron, 22 guns, 600 horse-power (on a $\frac{1}{4}$ -inch scale), length 280 ft., breadth 54 ft. 2 in., draught 24 ft. 3 in. forward, 25 ft. 5 in. aft, tonnage 3,720, displacement 5,971 tons, speed 11.618 knots, area of midship section immersed 1,086 square feet. Built by contract at Jarrow by Messrs. Palmer, Brothers. Laid down in December 1859; launched in April 1861.

Designed by the Surveyor's Department.

There was also built on the same lines the "RESISTANCE," at Poplar, by Messrs. Westwood, Baillie, and Co., in 1861.

The armament was as follows:

	No.	Prs.	Weight.	Length.
			cwt.	ft. in.
Main deck	- 16	- 68	- 95	10 0
Upper "	- { 2	- 68 pivot	- 95	10 0
	- 4	- 40 Armstrongs.		
	<hr/> 22			

The complement of men was 450.

434. The "HECTOR," built of iron, 32 guns, 800 horse-power (on a $\frac{1}{4}$ -inch scale), length 280 ft. 2 in., breadth 56 ft. 5 in., draught 24 ft. 2 in. forward, 25 ft. 8 in. aft, tonnage 4,089, displacement 6,455 tons, speed 12.36 knots, area of midship section immersed 1,183 square feet. Built by contract at Glasgow by Messrs. Napier and Sons. Laid down in March 1861; launched in September 1862.

Designed by Controller's Department.

There was also built on the same lines the "VALIANT," at Poplar, commenced by Messrs. Westwood, Baillie, and Co., and completed by the Thames Iron Shipbuilding Company, in 1863.

The armament was as follows:

	No.	Prs.	Weight.
			cwt.
Main deck	{ 24	- 68	- 95
	6	- 110 Armstrong	82
Upper "	22	- 110 "	82
	<hr/> 32		

The complement of men was 500.

435. The "MINOTAUR," built of iron, 50 guns, 1,350 horse-power (on a $\frac{1}{4}$ -inch scale), length 400 ft., breadth 59 ft. 4 $\frac{1}{4}$ in., draught 23 ft. 1 in. forward, 24 ft. 1 in. aft, tonnage 6,621, displacement 10,185 tons, speed 14.328 knots, area of midship section immersed 1,313 square feet. Built by contract at Blackwall by the Thames Iron Shipbuilding Company. Laid down in September 1861; launched in December 1863.

Designed by the Controller's Department.

There were also built on the same lines the "AGINCOURT," at Birkenhead, by Messrs. Laird, Brothers, in 1865; the "NORTHUMBERLAND," at Millwall, commenced by Messrs. C. J. Mare and Co., and completed by the Millwall Company in 1866.

The armament was as follows:

	No.	Prs.	Weight. cwt.	Length. ft. in.
Main deck	{ 26 -	68 -	95 -	10 0
	{ 8 -	110 -	82 -	10 0
Upper "	{ 6 -	110 -	82 -	10 0
	{ 10 -	70 -	60 -	9 2
	<hr/> 50			

The complement of men was 705.

436. The "ZEALOUS," built of wood, 20 guns, 800 horse-power (on a $\frac{1}{4}$ -inch scale), length 252 ft., breadth 58 ft. 7 in., draught 25 ft. forward, 25 ft. 9 in. aft, tonnage 3,716, displacement 6,102 tons, speed 11.7 knots, area of midship section immersed 1,185 square feet. Laid down at Pembroke Yard in October 1859; launched March 1864.

Designed by Mr. Reed and the Controller's Department.

The armament was as follows:

	No.	Prs.	Weight. cwt.
Main deck	- { 8 -	110 -	82 cwt.
	- { 8 -	68 -	95 "
Upper "	- 4 -	110 -	82 "
	<hr/> 20		

The complement of men was 455.

This ship was originally designed and commenced as a line-of-battle ship of 91 guns, 3,716 tons, and 800 horse-power; but by Admiralty order of July 2, 1862, she was converted to an armour-plated ship of 20 guns.

437. The "ROYAL OAK," built of wood, 34 guns, 800 horse-power (on a $\frac{1}{4}$ -inch scale), length 273 ft., breadth 58 ft. 6 in., draught 23 ft. 8 in. forward, 25 ft. 8 in. aft, tonnage 4,056, displacement 6,416 tons, speed 12.529 knots, area of midship section immersed 1,150 square feet. Laid down at Chatham Yard in May 1860; launched in September 1862. Designed by Controller's Department.

There were also built on the same lines the "CALEDONIA" at Woolwich, in 1862; the "PRINCE CONSORT" at Pembroke, in 1862; and the "OCEAN" at Devonport, in 1863.

The armament was as follows:

	No.	Prs.	Weight.
Main deck	{ 24	68	95 cwt.
	{ 8	110 Armstrongs	82 "
Upper "	{ 2	110	82 "
	<hr/> 34		

The complement of men was 605.

The ships of this class were originally designed and commenced as line-of-battle ships of 91 guns, 3,716 tons, and 800 horse-power; but by Admiralty order of May 14, 1861, they were converted to armour-plated ships.

A whole model of this ship will be found at Class I., Division A, No. 151, page 51 in the Catalogue.

438. The "ROYAL ALFRED," built of wood, 18 guns, 800 horse-power (on a $\frac{1}{4}$ -inch scale), length 273 ft., breadth 58 ft. 7 in., draught 19 ft. 8 in. forward, 22 ft. 9 in. aft, tonnage 4,068, displacement 6,720 tons, speed 12.359 knots, area of midship section immersed 1,191 square feet. Laid down at Portsmouth Yard in December 1859; launched in October 1864. Designed by Controller's Department.

The armament was as follows, viz.:

	No.	Prs.	Weight.
Main deck	{ 10	9-in.	12 $\frac{1}{2}$ -ton guns.
	{ 4	7 "	6 $\frac{1}{2}$ "
Upper "	{ 4	7 "	6 $\frac{1}{2}$ "
	<hr/> 18		

The complement of men was 600.

This ship was originally designed and commenced as a line-of-battle ship of 91 guns, 3,716 tons, 800 horse-power; but by Admiralty order of June 5, 1861, she was converted to an iron-cased ship.

439. The "LORD CLYDE," built of wood, 24 guns, 1,000 horse-power (on a $\frac{1}{4}$ -inch scale), length 280 ft., breadth 58 ft. 11 in., draught 22 ft. 3 in. forward, 24 ft. 9 in. aft, tonnage 4,067, displacement 7602 tons, speed 13·433 knots, area of midship section immersed 1,256 square feet. Laid down at Pembroke Yard in September 1863; launched in October 1864.

Designed by Mr. Reed and the Controller's Department.

The armament was as follows:

	No.	
Main deck	20	6 ton guns.
Upper "	4	110 Armstrongs.
	<hr/> 24	

The complement of men was 605.

440. The "REPULSE," built of wood, 12 guns, 800 horse-power (on a $\frac{1}{4}$ -inch scale), length 252 feet, breadth 59 ft., draught 25 ft. forward, 26 ft. 6 in. aft, tonnage 3,734, displacement 6,190 tons, speed 11 $\frac{1}{2}$ knots (estimated), area of midship section immersed 1,205 square feet. Laid down at Woolwich Yard in April 1859; launched April 1868.

Designed by the Controller's Department.

The armament was as follows:

	No.	Prs.	Weight.
Main deck	8	8 in.	9 tons.
Upper "	4	8 in.	9 "
	<hr/> 12		

The complement of men was 500.

This ship was originally commenced as a line-of-battle ship of 90 guns, 3,074 tons, and 800 horse-power; but by Admiralty order of October 9, 1866, she was converted to an armour-plated ship of 12 guns.

441. The "LORD WARDEN," built of wood, 24 guns, 1,000 horse-power (on a $\frac{1}{4}$ -inch scale), length 280 ft., breadth 59 ft. 0 $\frac{1}{2}$ in., draught 22 ft. 3 in. forward, 24 ft. 9 in. aft, tonnage 4,080, displacement 7,839 tons, speed 13·5, area of midship section immersed 1,280 square feet. Laid down

at Chatham Yard in December 1863; launched in May 1865.

Designed by Mr. Reed and the Controller's Department.

The armament was as follows:

	No.	Prs.
Main deck	- 20	- 6-ton guns.
Upper „	- 4	- 110-pr. Armstrongs.
	<hr/> 24	

The complement of men was 605.

442. The “BELLEROPHON,” built of iron, 14 guns, 1,000 horse-power (on a $\frac{1}{4}$ -inch scale), length 300 ft., breadth 56 ft. 1 in., draught 21 ft. 6 in. forward, 26 ft. 5 in. aft, tonnage 4,270, displacement 7,236 tons, speed 14.171 knots, area of midship section immersed 1,188 square feet. Laid down at Chatham Yard in December 1863; launched in April 1865.

Designed by Mr. Reed and the Controller's Department.

The armament was as follows:

	No.	Prs.
Main deck	- { 10 4	- 300 110 Armstrongs.
	<hr/> 14	

The complement of men was 475.

443. The “HERCULES,” built of iron, 14 guns, 1,200 horse-power (on a $\frac{1}{4}$ -inch scale), length 325 ft., breadth 59 ft., draught 22 ft. 11 in. forward, 26 ft. 5 $\frac{1}{2}$ in. aft, tonnage 5,226, displacement 8,676 tons, speed 14.691 knots, area of midship section immersed 1,313 square feet. Laid down at Chatham Yard in February 1866 in a dock, undocked in February 1868.

Designed by the Controller's Department.

The armament as follows:

	No.	
Main deck	- { 8 2	- 18-ton guns.
Upper „	- 4	- 12 „ „
	<hr/> 14	- 6 $\frac{1}{2}$ „ „

The complement of men, 600.

444. The "IRON DUKE," 14 guns, 800 horse-power, twin screw (on a $\frac{1}{4}$ -inch scale), length 280 ft., breadth 54 ft., draught 21 ft. 6 in. forward, 22 ft. 6 in. aft, tonnage 3,774, displacement 5,899 tons, speed 13·5 (estimated), area of midship section immersed 1,067 square feet. Laid down at Pembroke Yard in June 1867.

Designed by the Controller's Department.

There are also building on the same lines the "INVINCIBLE," and "AUDACIOUS," (launched February 1869), at Glasgow, by Messrs. Napier & Sons, and the "VANGUARD," at Birkenhead, by Messrs. Laird, Brothers.

The armament is to be as follows:

	No.	Prs.	Weight.
Main deck	- 6	- 9 in.	- 12½ tons.
Upper "	- { 4 4	- 64-prs. 9 in.	- 12½ tons.
	14		

The complement of men is to be 450.

HALF BLOCK MODELS.—TURRET SHIPS.

451*. The "SCORPION," late "EL TOUSSON," built of iron, 4 guns, 350 horse-power (on a $\frac{1}{4}$ -inch scale), length 224 ft. 6 in., breadth 42 ft. 4½ in., draught 14 ft. 11 in. forward, 16 ft. 4 in. aft, tonnage 1,833, displacement 2,660 tons, speed 10·515 knots, area of midship section immersed 604 square feet. Built by Messrs. Laird at Birkenhead; launched in July 1863.

Designed by Messrs. Laird.

There was also built on the same lines the "WIVERN," late "EL MONASSIR," at Birkenhead, at the same time.

Her armament was four 12-ton guns in turrets.

The complement of men was 150.

A whole Model of the "WIVERN," with *tripod* masts, fully rigged, will be found at Class I., Division A, No. 156, page 53, in the Catalogue.

452*. The "PRINCE ALBERT," built of iron, 4 guns, 500 horse-power (on a $\frac{1}{4}$ -inch scale), length 240 ft., breadth 48 ft. 1 in., draught 17 ft. 9 in. forward, 19 ft. 10 in. aft, tonnage 2,529, displacement 3,687 tons, speed 11·652 knots,

area of midship section immersed 760 square feet. Built by contract, at Blackwall, by Messrs. Samuda; laid down in April 1862; launched in May 1864.

Designed by Controller's Department.

Her armament was four 12-ton guns in turrets.

The complement of men was 200.

A whole Model of this ship will be found at Class I, Division A., No. 155, page 53, in the Catalogue.

453*. The "ROYAL SOVEREIGN," built of wood, 5 guns, 800 horse-power (on a $\frac{1}{4}$ -inch scale), length 240 ft. 7 in., breadth 62 ft. 2 in., draught 21 ft. 2 in. forward, 24 ft. 8 in. aft, tonnage 3,765, displacement 4,965 tons, speed 11·003 knots, area of midship section immersed 970 square feet. Commenced converting to an iron-cased turret ship in April 1862 at Portsmouth Yard, undocked in March 1864.

Designed by Controller's Department.

The armament was five 12-ton guns in turrets.

The complement of men was 200.

This ship was originally designed and built as a line-of-battle ship of 131 guns, 3,765 tons, and 800 horse-power, and launched as such in April 1857. By Admiralty order of 3d April 1862 she was converted to an iron-cased turret ship.

454*. The "MONARCH," built of iron, 6 guns, 1,100 horse-power (on a $\frac{1}{4}$ -inch scale), length 330 ft., breadth 57 ft. 6 in., draught 22 ft. 6 in. forward, 26 ft. aft, tonnage 5,100, displacement 8,164 tons, speed 14 knots (estimated), area of midship section immersed 1,224 square feet. Laid down at Chatham Yard in June 1866 in a dock, undocked in May 1868.

Designed by the Controller's Department.

Her armament was four 22-ton guns in turrets, and two 100-prs.

The complement of men was 525.

455*. The "CAPTAIN," built of iron, 6 guns, 900 horse-power (on a $\frac{1}{4}$ -inch scale), length 320 ft., breadth 53 ft. 3 in., draught 22 ft. 6 in. forward, 23 ft. 6 in. aft, tonnage 4,272, displacement 6,950 tons, speed 14 knots (estimated), area of midship section immersed 1,078 square feet. Building by contract, by Messrs. Laird, at Birkenhead.

Designed by Messrs. Laird and Capt. Coles, R.N., C.B.

456*. The "CERBERUS," built of iron, 4 guns, 350 horse-power (on a $\frac{1}{4}$ -inch scale), length 225 ft., breadth 45 ft., draught 15 ft. 6 in. forward, 15 ft. 6 in. aft, tonnage 2,107,

displacement 3,413 tons, speed 8 knots (estimated), area of midship section immersed 663 square feet. Built at Jarrow by the Palmer Iron Shipbuilding Company (Limited) for the Melbourne Government. Laid down September 1867, launched December 1868.

Designed by the Controller's Department.

The armament is to be four 18-ton guns mounted in turrets.

The complement of men will be 155.

HALF BLOCK MODELS.—IRON-CASED SHIPS. DESIGNS PROPOSED BUT NOT ADOPTED.

376. Design for an iron-cased ship, 12 guns, 800 horse-power (on a $\frac{1}{4}$ -inch scale), length 290 ft., breadth 53 ft., draught of water 22 ft. 6 in., tonnage 3,794, displacement 6,206 tons, estimated speed 15 knots.

The armament to be as follows, viz.:

Main Deck	- 6	-	-	12-ton guns.
Upper Deck	{ 4	-	-	12 " "
	{ 2	-	-	64-pounder guns.
		<hr/>		
		12		

The complement of men to be 450.

Proposed by the Thames Ironworks and Shipbuilding Company. 1867.

This model and the three others in the Appendix at Nos. 377 and 378, Class I., Division B, pages 47 and 48, and No. 185* Class I., Division A, page 10, represent four designs for iron-cased ships which were prepared in compliance with a letter from the Admiralty in May 1867, to certain shipbuilding firms inviting them to send in competitive plans for an iron-cased ship of from 3,500 to 3,800 tons, to be either on the turret or broadside principle, at the option of the designer.

For further particulars in regard to these designs see Parliamentary Paper dated 3rd December 1867, No. 26.

377. Design for a combined turret and broadside twin-screw iron-cased ship, 10 guns, 800 horse-power (on a $\frac{1}{4}$ -inch scale), length 285 ft., breadth 53 ft., draught of water 21 ft. 6 in. forward, 22 ft. 6 in. aft, tonnage 3,749, displacement 5,780 tons, estimated speed 13.5 knots.

The armament to be as follows, viz :

Main Deck	-	6	-	-	12	ton guns, broadside.
Upper Deck	{	2	-	-	12	" " "
		2	-	-	12	" " in one turret.
<hr/>						
10						

The complement of men to be 450.

Proposed by the Millwall Iron Company. 1867.

This model and the three others in the Appendix, at Nos. 376 and 378, Class I., Division B., pages 47 and 48, and No. 185*, Class I., Division A., page 10, represent four designs for iron-cased ships which were prepared in compliance with a letter from the Admiralty in May 1867, to certain shipbuilding firms inviting them to send in competitive plans for an iron-cased ship of from 3,500 to 3,800 tons, to be either on the turret or broadside principle, at the option of the designer.

For further particulars in regard to these designs see Parliamentary Paper, dated 3rd December 1867, No. 26.

378. Design for a twin-screw iron-cased turret ship, 4 guns, 800 horse-power (on a $\frac{1}{4}$ -inch scale), length 250 ft., breadth 45 ft., draught of water 22 ft. 6 in., tonnage 2,402, displacement 4,872 tons, estimated speed 15 knots.

The armament to be four 600-pounder guns in a fixed turret.

Proposed by Mr. J. G. Laurie. 1867.

This model and the three others in the Appendix at Nos. 376 and 377, Class I., Division B., page 47, and No. 185*, Class I., Division A., page 10, represent four designs for iron-cased ships which were prepared in compliance with a letter from the Admiralty in May 1867 to certain shipbuilding firms inviting them to send in competitive plans for an iron-cased ship of from 3,500 to 3,800 tons, to be either on the turret or broadside principle, at the option of the designer.

For further particulars in regard to these designs see Parliamentary Paper dated 3rd December 1867, No. 26.

379. MODEL (on a $\frac{1}{4}$ -inch scale) of a design for an iron-cased twin-screw turret ship for Bombay, 600 horse-power, tonnage 2,015. Proposed by the Millwall Iron Company. 1866.

The part coloured yellow is movable, and represents a light temporary structure to be placed on the ship for the voyage out only.

CLASS I.—DIVISIONS C, D, and E.

N.B.—There have been no models added to these Divisions since the Catalogue was published.

CLASS II.

Models of various Boats in use in Great Britain for Men-of-War, for saving Life, and other Purposes (also Life Rafts, Life Belts, Preservers, &c.).

Divisions.

- | | |
|---|--|
| <p>A.—Man-of-war's boats.
 B.—Boats fitted for fighting guns, laying out anchors, &c.
 C.—Boats and rafts for landing or embarking troops, &c.
 D.—Life boats, life rafts, buoys, preservers, &c.</p> | <p>E.—Plans for lowering boats, and stowing and securing them on board ship.
 F.—Miscellaneous boats and appliances.</p> |
|---|--|

CLASS II.—DIVISION A.

MAN-OF-WAR'S BOATS.

12. HALF BLOCK MODEL (on a $\frac{3}{4}$ -inch scale), of the ordinary service, 28 ft. pinnace, of the improved form in use in H.M.'s Navy. 1865.

13. HALF BLOCK MODEL (on a $\frac{3}{4}$ -inch scale), of the ordinary service, 30 ft. cutter, of the improved form in use in H.M.'s Navy. 1865.

14. HALF BLOCK MODEL (on a $\frac{3}{4}$ -inch scale), of the ordinary service, 30 ft. gig, of the improved form in use in H.M.'s Navy. 1865.

15. HALF BLOCK MODEL (on a $\frac{3}{4}$ -inch scale), of the ordinary service, 42 ft. launch, of the improved form in use in H.M.'s Navy. 1865.

CLASS II.—DIVISIONS B and C.

N.B.—There have been no models added to these divisions since the Catalogue was published.

CLASS II.—DIVISION D.

LIFE BOATS, LIFE RAFTS, BUOYS, PRESERVERS,
&c.

91. MODEL of plan for an iron life boat, with water-tight cases along the sides, water-tight spaces under the flat, water-tight cases at the extremities, and an open grating in the bottom to enable the water which may be taken in over all to run out of itself through the bottom. At the extremities are portable cases for holding provisions, &c.

Proposed by Mr. W. Horne, 1866.

92. Model of a plan for increasing the buoyancy of boats, without adding permanently to their bulk, by fitting on the outside of their bottoms air tight chambers with flexible sides like a pair of bellows. These chambers to be distended when the boat is in the water, and to be made to collapse for convenience of stowing the boat when out of the water.

Proposed by Mr. J. White of Finchley, 1866.

93. MODEL of Signor Candide Ravelly's apparatus for saving life. It consists of an elastic sack filled with air, on which the person sits supported by two iron bars. (The sack has become detached, and is not exhibited.)

Proposed by Signor Candide Ravelly, 1866.

94. MODEL (on a 1-inch scale) of the stern of a ship showing the life-buoy, with all necessary fittings for letting go, guards, &c., as generally fitted to ships in H.M.'s Navy.

1866.

CLASS II.—DIVISION E.

PLANS FOR LOWERING BOATS, AND STOWING
AND SECURING THEM ON BOARD SHIP.

120. MODEL of a plan for lowering and disengaging boats at sea in the following manner, viz., the two falls are wound on the same roller or drum, and are thereby lowered simultaneously. The lower part of the block to which each end of the boat is hung consists of a tumbling hook or bar, the point of the hook is inserted behind a flange fitted on the end of a revolving pin; this flange confines the hook

excepting at one place, where a notch is cut out sufficient to allow the point of the hook to pass through it, and thereby to release the boat. The bringing of the pins round to the proper position for letting go is accomplished as follows:— There is a grooved wheel on the end of each pin, with a projecting stud on it, over which the end of a line is passed; the other end of each line after passing through a leading block is wound on a wheel or drum under the midship thwart; by lifting a lever attached to this drum the lines are taken in and the pins are made to turn round through the required angle.

The model also represents a plan for disengaging the gripes by means of a tumbling hook or bar similar to that described above, which can be released by turning a lever fitted inside the ship.

Proposed by Lieut. E. R. May, of Her Majesty's late Indian Navy. 1866.

121. MODEL of a plan for turning boats in. Proposed by Captain Henry W. Hire, R.N. 1867.

122. WORKING MODEL of Murray's Patent Lowering Apparatus for Boats. 1866.

123. SPECIMEN of Murray's Patent Lower Purchase Blocks for Lowering Boats. This and the preceding invention were proposed by Mr. Digby Murray, Ormskirk, Lancashire, 1866.

124. MODEL (on a 2-inch scale) of a section of a ship's side, with a 28 ft. cutter suspended at the davits by Kynaston's Boat Lowering Hooks: also a specimen hook full size.

This invention is generally adopted in the Royal Navy, it enables boats to be lowered quickly and safely from ships underway, and is so arranged that after the lowering has commenced the officer in charge of the boat still retains command of the hook until he considers the boat should be freed, when by letting go the small lanyard, hitherto held in his hand, both hooks are instantaneously disengaged.

1862.

125. Section (on a $\frac{1}{2}$ -inch scale) of a deck, showing the crutches as generally fitted to ships in the Royal Navy, with the boats and booms stowed, and all spare gear.

1867.

CLASS II.—DIVISION F.

MISCELLANEOUS BOATS AND APPLIANCES.

159. MODEL of an iron-clad boat to carry one man or more. It is meant to be so buoyant that when the waves strike it the water shall run out before it flows over the weir. The lid is to be water-tight, and made to shut when the man or men are inside. The sight is to open and close like a skylight window, that the man may fire over the weir. The top is to be of steel, and bullet-proof. The man is to sit on the bottom of the boat and propel it with his feet, by means of propellers on the soles of his boots, to open and close at each stroke, and likewise by means of propellers to work with the hand on each side of the boat. These are to be made something similar to those represented in the inside of the boat. Univalvular joints are to be fitted for the propellers to work in. The mark on the side of the boat is for the propellers, which all work under water. It is supposed by the inventor that ships might be built on the same model.

Proposed by Mr. Robert Ballantyne, 1866.

CLASS III.

Models of Boats and Vessels used for Fighting and other Purposes at various Periods in Foreign Countries.

46. MODEL (on a $\frac{1}{4}$ -inch scale) of a twin screw yacht, built for the Emperor of the French. Length 61.88 ft., breadth 12.73 ft., draught of water 3.44 ft. forward, 4.72 ft. aft, speed 11 knots. Built in 1862.

47. Half-Block MODEL (on a $\frac{1}{4}$ -inch scale), of a design for an iron-cased ship, to be built of iron, 500 horse power, length 270 ft., breadth 50 ft., draught of water 19 ft. 9 in. forward, 20 ft. 0 in. aft, tonnage 3,200, speed 11 knots.

Built by contract by Messrs. J. and G. Thompson, at Glasgow, for the Turkish Government, about the year 1864.

CLASS IV.

Models showing Details of the Mode of Construction adopted or proposed for particular Parts of Ships and the principal Changes which have at various Periods been made therein.

Divisions.

WOODEN SHIPS.

- A.—Keels, including blocks and wedges.
- B.—Floor timbers.
- C.—Futtocks and frames of ships.
- D.—Bow (framing).
- E.—Stern (framing, &c.)
- F.—Wales.
- G.—Beams.
- H.—Knees, shelf-piece, water-ways, &c., and mode of connecting beams to the ship's side.
- I.—Models of more general principles in the construction of wooden ships which cannot be classed under the above heads, such as diagonal riders, &c.

IRON SHIPS.

- K.—Keels.
- L.—Bow, stern, and midship framing.
- M.—Skin plating and riveting.
- N.—Beams, and mode of connecting the same to the ship's side.
- O.—Models of more general principles in the construction of iron ships which cannot be classed under the above heads, such as keelsons, longitudinal stringers, water-tight bulkheads, &c.

P.—Plans for fastening armour plates, including bolts, &c. for that purpose, also models showing the arrangement of armour plates.

Q.—Plans for rendering ships shot-proof. (See also Class I. Div. A.)

R.—Construction of composite ships.

CLASS IV.—DIVISIONS A to N.

N.B.—There have been no Models added to these Divisions since the Catalogue was published.

CLASS IV.—DIVISION O.

MODELS OF MORE GENERAL PRINCIPLES IN THE CONSTRUCTION OF IRON SHIPS WHICH CANNOT BE CLASSED UNDER THE ABOVE HEADS, SUCH AS KEELSONS, LONGITUDINAL STRINGERS, WATER-TIGHT BULKHEADS, &c.

278. MODEL of a portion of a ship's side and a bulkhead, showing a method of attaching a water-tight bulkhead to a ship's side, with double frames and doubling plates to the

outside strakes of plating, as adopted in the construction of ships for the Mercantile Marine, and approved of by Lloyd's (1865).

- A. Shows the frames ;
- B. The double frames ;
- C. The outside strakes ;
- D. The inside strakes ;
- E. The doubling plates ;
- F. The bulkhead stiffeners ;
- G. The bulkhead plates ; and
- H. The joggle, by means of which the ends of the joints of the bulkhead plates between the double frames are brought flush.

279. Half mid-ship section (on a $\frac{1}{2}$ -inch scale) of H.M.'s iron-cased frigate "BELLEROPHON," launched April 1865, showing the detailed arrangement of the framing, and mode of combining the several parts of the hull amidships ; the features having the greatest claim to novelty being distinguished by letters.

- A. Flat keel plates worked in two thicknesses, continuously.
- B. Vertical keel plates, continuous.
- C. Vertical keelson, continuous.
- D. Water-tight transverse frames fitted between longitudinals.
- E. Short transverse bracket frames fitted between longitudinals.
- F. Longitudinal frames, continuous.
- G. Transverse angle irons.
- H. Transverse frames.
- I. Inner bottom plating.
- K. Box boiler bearers.
- L. Wing passage bulkhead.
- M. Transverse water-tight bulkhead.
- N. Plates to support the ends of beams under battery.
- O. Girders to support the beams under battery.
- P. Gutter for draining decks, continuous.
- Q. Bracket frames to form top sides.
- R. Bilge keels.
- S. Top side plates behind armour, worked in two thicknesses, continuously. —
- T. External longitudinal girders, continuous.
- U. Wood backing, 10 in. thick, worked longitudinally.
- V. Six-inch armour plates.

230. MODEL (on a $\frac{1}{2}$ -inch scale) of the stern framing of H.M. iron-cased frigate "BELLEROPHON," launched April 1865, showing the stern post, stern tube, after-part of keels, and mode of securing the lower part of the balanced rudder.

231. Half midship section (on a $\frac{1}{2}$ -inch scale), of H.M. iron-cased frigate "HERCULES," built in 1868, showing the detailed arrangement of the framing and mode of combining the several parts of the hull amidships; the features having the greatest claim to novelty being distinguished by letters.

- A. Flat keel plates, worked in two thicknesses, continuously.
- B. Vertical keel plates, continuous.
- C. Vertical keelson, continuous.
- D. Water-tight transverse frames, fitted between longitudinals.
- E. Short transverse bracket frames, fitted between longitudinals.
- F. Longitudinal frames, continuous.
- G. Transverse angle irons.
- H. Transverse frames.
- I. Inner bottom plating.
- K. Box boiler bearers.
- L. Wood fillings, worked longitudinally between the ship's side and the side bulkhead.
- M. Side bulkhead.
- N. Transverse water-tight bulkhead.
- O. Gutters for draining decks, continuous.
- P. Bilge keels.
- Q. Top side plates behind armour, worked in two thicknesses, continuously.
- R. External longitudinal girders, continuous.
- S. Wood backing, 12 in. thick, worked longitudinally.
- T. 9-in. armour plates.
- U. 8-in. armour plates.
- W. 6-in. armour plates.

232. MODEL (on a $\frac{1}{8}$ -inch scale) of a plan for constructing an iron-clad ship, by which the inventor supposed the following advantages would be obtained:

- (a.) The lines would give a sharp floor and form a natural bilge piece, being nearly horizontal, in order to lessen the rolling properties.
- (b.) The upper works being inclined at an angle would deflect the shot, and require less heavy plating.

- (c.) A central battery could be built from the base of the angle which the sides form.
- (d.) The form of side admits of firing fore and aft in a line parallel to the keel.
- (e.) The bilge pieces are adapted to admit of twin screws, and give great strength.

Proposed by George Kirkley, shipwright, Woolwich Dockyard. 1867.

283. MODELS, two in number (*a* and *b*), descriptive of a plan for constructing iron shot-proof ships, showing the framing, skin-plating, mode of attaching armour-plates, &c.

Proposed about the year 1862, but the name of the inventor and the exact date are not known.

CLASS IV.—DIVISION P.

PLANS FOR FASTENING ARMOUR-PLATES, INCLUDING BOLTS, &c., FOR THAT PURPOSE; ALSO MODELS SHOWING THE ARRANGEMENT OF ARMOUR-PLATES.

348. Plan for rendering ships shot-proof by means of armour-plates of a peculiar form.

Proposed by Mr. S. G. Dutton, 1865.

349. Plan for the washers for the points of armour-plate bolts, made of india-rubber rings, let into iron cups. A and B are two slightly different modes of applying this plan. C. C. C. are three specimens of the india-rubber ring.

Proposed by Mr. B. Truss, 1865.

350. Two MODELS (A and B) of iron spring washers for the points of armour-plates and other bolts.

Proposed by Mr. W. Paget, and ordered to be tried in 1865.

351. MODEL (on a $\frac{1}{4}$ -inch scale) of a plan for protecting the lower part of a turret by placing a circular belt of armour-plating close against the turret instead of armour-plating the ship's side; the model also shows (by removing the part marked A), in the event of a portion of the side and deck of the ship being shot away, what support would remain for the cylindrical belt of armour-plating.

Proposed by Capt. C. P. Coles in 1866.

(The Model will be found at Class VII., Division F., No. 174, Appendix, page 78.)

352. MODEL of a plan for armour-plating ships. It proposes that armour-plates should be only about 2 ft. square, that they should be made in an arched form, and be fastened by bolts between the edges, and that either in front of them or behind them there should be a network of interwoven hoop iron about 6 in. thick.

Proposed by Mr. Lockhart Morton, Melbourne, 1867.

353. MODEL of bolt for fastening armour-plates, made so as to prevent the fracture of the bolt at the thread by giving the bolt a certain facility of elongation. This is done by cutting a narrow longitudinal slot out of the bolt, or rather by making a welded bolt with a slot-shaped vacancy as shown in the model.

Proposed by Mr. James Chalmers, 1866.

CLASS IV.—DIVISION Q.

PLANS FOR RENDERING SHIPS SHOT-PROOF.

412. Three MODELS (A, B, and B B) of a plan for rendering ships shot-proof by means of bolts with large hemispherical heads instead of armour-plates. A and B are two slightly different modes of applying the plan, B B represents the bolt.

Proposed by Mr. H. Keach, in 1865.

413. A set of MODELS, four in number (A, B, C, and D), showing a plan for constructing iron-cased ships, and for working guns in the following manner, viz.:

A shows the ship's side, which is to be inclined from the gun-deck upwards at an angle of 60° from the vertical, and also instead of the ordinary portholes a proposal to frame apertures in the side, 5 ft. wide, and to place therein solid cylinders or turrets of iron, 5 ft. in diameter and 7 ft. high, capable of turning on their centre; a hole is cut in the cylinder large enough to receive the muzzle of the gun, and to admit of the necessary elevation and depression. When firing, therefore, the exposed aperture is to be limited in the fore and aft direction to the width of the muzzle of the gun, and after the gun has been fired and run in, the cylinder can be turned round so as to completely close the port.

B represents a plan for bringing the armour-plates directly on the frames of the ship; the frames to be made of the peculiar form shown, and to be supported by diagonal bars of similar shape forming truss work. The spaces between

the frames and bars to be filled with a "rammed sand core." The armour-plates to be fastened by first bolting to the ship's side vertical plates or strips having in them a dovetail groove. A similar groove is also cut out of the corresponding part of the armour-plate, and when the plates are in place the grooves are filled up and the plates thereby secured either by driving in long wooden keys, or by pouring in molten metal.

C and D shew a further proposal to connect the plates at their edges and butts by the insertion of similar double dovetail strips.

Proposed by Mr. G. Johnson, 1866.

414. MODEL (on a $\frac{3}{4}$ -inch scale) of a target representing a portion of the side of H.M. iron-cased frigate "WARRIOR," launched in 1860, showing the means adopted for rendering the ship shot proof.

Its component parts may be described as follows, viz. :

- A. Armour plates $4\frac{1}{2}$ in. thick.
- B. Wood backing, in two thicknesses of 8 in. and 10 in., with an iron longitudinal stringer worked into it made up of a web plate 10 in. \times $\frac{9}{16}$ in., having double angle irons $3\frac{1}{2}$ in. \times $4\frac{1}{2}$ in. \times $\frac{9}{16}$ in. riveted to it and the skin plating.
- C. Skin plating $\frac{9}{16}$ in. thick, the upper and lower strake being worked double.
- D. Vertical frames made up of web plates 10 in. \times $\frac{7}{16}$ in. with double angle irons $3\frac{1}{2}$ in. \times $4\frac{1}{2}$ in. \times $\frac{7}{8}$ in. riveted to them and the skin plating, and reverse angle irons $3\frac{1}{2}$ in. \times $3\frac{1}{2}$ in. \times $\frac{1}{2}$ in.

This model is so constructed that it may be taken to pieces to show the various parts. A target such as this model represents was constructed and fired at at Shoeburyness in 1861.

415. MODEL (on a $\frac{3}{4}$ -inch scale) of a target representing a portion of the side of H.M. iron-cased frigate "BELLE-ROPHON," launched in 1865, showing the mode of construction adopted for rendering the ship shot proof.

Its component parts may be described as follows:

- A. Armour plates 6 in. thick.
- B. Wood backing 10 in. thick, with longitudinal angle iron stringers worked into it, those behind the upper armour plates being 9 in. \times $3\frac{1}{2}$ in. \times $\frac{1}{2}$ in., and those behind the lower plates 10 in. \times $3\frac{1}{2}$ in. \times $\frac{1}{2}$ in., all of them riveted to the skin plating.

- C. Skin plating in two thicknesses of $\frac{3}{4}$ in.
- D. Vertical frames made up of angle irons 10 in. \times $3\frac{1}{2}$ in. \times $\frac{1}{2}$ in., with double angle irons riveted to them and the skin plating.

This model is so constructed that it may be taken to pieces to show the various parts. A target such as this model represents was constructed and fired at at Shoeburyness in 1863.

416. MODEL (on a $\frac{3}{4}$ -inch scale) of the Chalmers' target, intended to represent a portion of the side of an iron-cased ship, showing a mode of construction for rendering ships shot-proof.

Proposed by Mr. Chalmers.

The principal component parts may be described as follows:

- A. Armour plates $3\frac{1}{4}$ in. thick.
- B. Backing, composed of alternate layers of timber planking and iron ribs 10 in. thick.
- C. Intermediate armour plate $1\frac{1}{4}$ in. thick.
- D. Cushion of timber planking, 4 in. thick.
- E. Skin plating $\frac{5}{8}$ in. thick.
- F. Vertical frames made up of angle irons 10 in. \times $3\frac{1}{2}$ in. \times $\frac{1}{2}$ in., with double angle irons $3\frac{1}{2}$ in. \times $3\frac{1}{2}$ in. \times $\frac{1}{4}$ in. riveted to them and to the skin plating.

This model is so constructed that it may be taken to pieces to show the various parts. A target such as this model represents was constructed and fired at at Shoeburyness in 1865.

417. MODEL (on a 1-inch scale) of a target representing a portion of the side of H.M. iron-cased frigate "HERCULES," built 1868, showing the mode of construction adopted for rendering the ship shot proof.

Its component parts may be described as follows:

- A. Armour plates 8 in. and 9 in. thick respectively.
- B. Wood backing, proper, 12 in. thick, with longitudinal angle iron stringers 12 in. \times $3\frac{1}{2}$ in. \times $\frac{5}{8}$ in. worked into it and riveted to the skin plating.
- C. Skin plating proper, in two thicknesses of $\frac{3}{4}$ in.
- D. Vertical frames made up of angle irons 10 in. \times $3\frac{1}{2}$ in. \times $\frac{1}{2}$ in. with double angle irons $3\frac{1}{2}$ in. \times $3\frac{1}{2}$ in. \times $\frac{1}{2}$ in. riveted to them and the skin plating.
- E. Inner wood backing, 2 ft. thick at the upper part and 1 ft. 4 in. at the lower part.
- F. Inner skin plating $\frac{5}{8}$ in. thick.

G. Inner vertical frames made up of angle irons 7 in. \times $3\frac{1}{2}$ in. \times $\frac{1}{2}$ in. with single angle irons $3\frac{1}{2}$ in. \times $3\frac{1}{2}$ in. \times $\frac{5}{8}$ in. riveted to them and the skin plating.

This model is so constructed that it may be taken to pieces to show the various parts. A target such as this model represents was constructed and fired at at Shoeburyness in 1865.

418. Plan for rendering ships shot-proof by making the sides of the ship at the water-line project some 6 ft. or 8 ft., this extra breadth to be divided into compartments to be filled with tow, cork, or some such material.

Proposed by Mr. Edward James Julian. 1867.

(The model will be found at Class I., Division A, No. 189*, Appendix, page 12).

419. MODEL illustrative of a plan for covering ships with layers of galvanised wire network, for affording protection against the blows of shot, rocks, &c., especially to secure merchant ships against injury by grounding, but also for ships of war as a substitute for armour plates.

Proposed by Mons. Alphonse Lemaitre. 1867.

420. Specimen of Mr. Bielefield's patent fibrous slab, proposed by Captain R. Scott, R.N. for coating the outsides of armour plates to increase their resistance to shot. 1865.

(The specimen will be found at Class XVII., No. 26, page 114, Appendix.)

421. MODEL (on a $1\frac{1}{2}$ -inch scale) of a target representing a portion of the side of a ship with deflecting sides below the water, as well as above, to make them secure against shot on the plan proposed by Mr. J. M. Hyde.

Mr. Hyde proposed that a target, such as this model represents, should be constructed and fired at at Shoeburyness. 1866.

(See also Class I., Division A, No. 188*, Appendix, page 11.)

422. MODEL of a plan for protecting the sides of ships against shot by the following combination:—1st, on the outside, 6 centimetres of iron; 2nd, 2 centimetres of lead; 3rd, 19 centimetres of an impermeable composition the nature of which is not stated; 4th, 8 centimetres of cork; making in all a thickness of 35 centimetres.

Proposed by Mr. Joseph Soldevilla. 1867.

CLASS IV.—DIVISION R.

CONSTRUCTION OF COMPOSITE SHIPS.

480. MODEL showing bottom planking in composite gun boats of "Dwarf" class, secured with yellow metal bolts instead of copper bolts.

Proposed by the Chatham Officers, and tried in the "BEACON," for fastening the outer thickness of planking. 1867.

481. Specimens of yellow metal screw bolts used in the composite gun boats of the "Dwarf" class after being tested at Portsmouth Dockyard. 1867.

CLASS V.

Models showing the Mode of fitting various Parts of Ships.

Divisions.

- A.—Hawse holes.
- B.—Catheads, and modes of fitting them.
- C.—Magazines, magazine passage lights, &c.
- D.—Cabins and their fittings, such as louvre and venetian frames, bulkheads, cants, &c.
- E.—Hatchways and skylights, with coamings, also ladders, &c.
- F.—Port sashes, and their mode of fitting.
- G.—Plans for fitting ports, half-ports, and for raising and securing the same.

- H.—Ship's side and port scuttles, and mode of securing them.
- I.—Ventilation of ships, air tubes, &c.
- J.—Scuppers.
- K.—After parts of ships, showing the arrangements necessary in connexion with the screw propeller, and to enable it to be raised.
- L.—Shot-proof conning houses, evolution bridges, &c.
- M.—Miscellaneous fittings which cannot be classed under any one of the preceding heads.

CLASS V.—DIVISION A.

HAWSE HOLES.

8. Section (on a $\frac{1}{2}$ -inch scale) of the bow of H.M.S. "NIOBE," launched in 1866, showing the hawse hole, and method of fitting the plugs and bucklers, as generally adopted in H.M. service. 1866.

CLASS V.—DIVISION B.**CATHEADS AND MODES OF FITTING THEM.**

37. MODEL on a $\frac{1}{2}$ -inch scale of the bow of H.M.S. "BELLEROPHON," launched in 1865, showing the anchor, with the necessary fittings for stowing and letting go, including bolsters, chocks, and linings, bill-boards and plates, shank painter, slip stopper, crutches, fish davits and steps, and all necessary bolts and cleats, as generally fitted to ships in H.M. Navy. 1866.

The anchor itself, however, is not the common Admiralty anchor, but one on Rodger's plan.

CLASS V.—DIVISION C.

MAGAZINES, MAGAZINE PASSAGE LIGHTS, &c.

62. Sectional MODEL (on $\frac{1}{2}$ -inch scale) of H.M.S. "NIOBE," launched in 1865, showing the magazine and all internal works, and of the light, handing, and shell rooms, with all light boxes, lamps, lanterns, and guards thereto, also the ventilating and telegraphic arrangements, as generally fitted in ships in H.M. Navy. 1866.

CLASS V.—DIVISION D.

N.B.—There have been no models added to this division since the Catalogue was published.

CLASS V.—DIVISION E.**HATCHWAYS AND SKYLIGHTS, WITH
COMBINGS, &c., ALSO LADDERS.**

119. Sectional MODEL (on a 1-inch scale), showing a skylight with sashes and dead lights, as generally fitted in ships in H.M. Navy. 1866.

120. Section (on a 1-inch scale) showing the companion and hoods over hatch and ladder ways, as generally fitted to ships in H.M. Navy. 1866.

121. Section (on a $\frac{1}{2}$ -inch scale) of a ship's side, showing the accommodation ladder, with platform, stanchions, and all necessary fittings, as generally supplied to ships in H.M. Navy. 1866.

CLASS V.—DIVISION F.

PORT SASHES, AND THEIR MODE OF FITTING.

155. MODEL (on a $\frac{1}{2}$ -inch scale) of the stern of H.M.S. "BRISTOL," launched 1861, showing the munions and stern sashes, with blinds or deadlights, as generally fitted to ships in H.M. Navy. 1866.

CLASS V.—DIVISION G.

PLANS FOR FITTING PORTS, HALF-PORTS, AND FOR RAISING AND SECURING THE SAME.

204. MODEL of a port lid and frame, fitted with an improved kind of india-rubber beading.

Proposed by Mr. R. C. Fuller, June 1865, as an improvement on his previous plans. (See Catalogue, Class V., Division G. Nos. 202 and 203, page 159.)

205. Improved hinge for winding port and scuttle lids, adapted to suit any angle.

Proposed by Mr. Stone in 1865, and generally adopted.

206. MODEL (on a $\frac{1}{2}$ -inch scale), showing the ports at the corners of the battery in the "PENELOPE," launched in 1867. B B are the proposed fashion-pieces to be worked in with the plank, for taking out the angles and improving the appearance.

207. MODEL of a part of the side of the "HERCULES," built 1868, with an 18-ton gun mounted, showing the amount of squaring of port and training of the guns which can be obtained at extreme elevation and depression.

Proposed by the Chatham officers, December 1866, and adopted with slight modification.

208. Sectional MODEL (on a $\frac{1}{2}$ -inch scale) of H.M.S. "CALEDONIA," launched 1862, showing a gun deck port, with the port lids, and means of securing the same, as generally fitted to ships in H.M. Navy. 1866.

209. MODEL showing, instead of the ordinary port-holes, a proposal to frame apertures in the side, 5 ft. wide, and to place therein solid cylinders or turrets of iron, 5 ft. in diameter, and 7 ft. high, capable of turning on their centre; a hole is cut in the cylinder large enough to receive the muzzle of the gun, and to admit of the necessary elevation and depression. When firing, therefore, the exposed aperture is to be limited in the fore and aft direction to the width of the muzzle of the gun, and after the gun has been fired and run in, the cylinder can be turned round so as to completely close the port.

Proposed by Mr. G. Johnson. 1866.

(This model will be found at Class IV., Division Q, No. 413, Appendix, page 57.)

210. Sectional MODEL (on a $\frac{1}{2}$ -inch scale) of H.M.S. "NIRORE," launched 1866, showing a gun deck port, with the port lids and all fastenings, rings, bolts, nozzles for pendants, &c., as generally fitted to ships in H.M. Navy. 1866.

CLASS V.—DIVISION H.

SHIP'S SIDE AND PORT SCUTTLES, AND MODE OF SECURING THEM.

250. Half-size MODEL of a plan of fitting port scuttles proposed by the Portsmouth officers, suitable for all descriptions of scuttles, being a modification of a plan suggested by Commander Stirling, to supersede the usual mode of fitting with a chain or a prop. A segment or bar is fitted for opening the scuttle, having a hinge, or an eye in an eye on the scuttle, to prevent the bar being lost if unshipped.

It is proposed to secure the port by keys as shown, like those used for Lang's tubes.

The bar not to be longer than is necessary for raising the scuttle to the level. 1866.

251. Half-size MODEL of a plan of fitting port scuttles; proposed by the Chatham officers, and fitted in the "REIN-DEER," launched in 1866.

The scuttles are kept open by a prop, which is considered more convenient than the bar, because it enables sashes to be fitted in all the ports. These can be removed for cleaning by taking out the beads, which are secured by metal screws. 1866.

Adopted for all new ships, to be fitted to every port right fore and aft, except in special cases.

252. Sectional MODEL (on a 3-inch scale) of a ship's side, showing the Lang's tube scuttle, plug, and all fittings connected therewith, as generally fitted to ships in H.M. Navy. 1866.

CLASS V.—DIVISION I.

VENTILATION OF SHIPS, AIR TUBES, &c.

289. MODEL of a fire-proof ventilator for spirit rooms, formed of metal bars, which are fitted so that one set of bars, made to form acute angle edges, will overlap another set of bars with obtuse angles alternately, with sufficient space between the bars to form winding passages for air to pass around, and not in direct currents through them. Between the frames of metal bars two partitions of wire gauze are fitted, through which flame cannot pass.

Proposed by Mr. W. Ladd, master shipwright, Deptford Yard, in 1865.

290. MODEL of a self-acting ventilator for the ventilation of ships, barrack-rooms, or workshops. The model shows the plan as adapted to a small work room under arches, without any escape for the air except through the window in the area. The ventilator is set in motion by the action of the door, working a closely-fitting fan inside, which rests on pivots near the nozzle, and acts both upward and downward. There are two valves near the nozzle, opening outwards which prevent the foul air returning.

The mode of working it can be varied to suit any circumstances by a driving band connected with a steam engine, for mines, large rooms, steam ships; or by a pendulum and weight for smaller rooms or sailing ships, or any other method for railway tunnels and store rooms.

Proposed by Mr. Thomas Moorcock, 1867.

291. Working MODEL of a self-acting ventilator, for getting rid of impure air and getting a supply of pure air without draught.

Proposed by Mr. M. Tossell, 1866.

292. Plan of ventilating tube for escape of foul air from the magazines of sloops, to be fitted to the upper part of the magazine bulkhead, which will convey the tainted air into the holds or storerooms, to be dispersed through the hatchways.

The ventilator is made in three parts: the centre tube, which has two wire gauze webs fitted in the inside, will pass through the bulkhead, with inner and outer tubes one-third of its length to fit into it, having perforated faces and flanges for securing them with screws on both sides of the bulkheads. With this description of ventilator the magazine will be perfectly secure in the event of fire until the bulkhead should be burnt through; and in order that it may be opened only on the occasions of working the magazine, the outer end is fitted with a sliding shutter, which moves forward and back by the action of turning the key for locking and unlocking, which key should always be in the custody of a responsible person.

Proposed by Mr. William Ladd, master shipwright, at Woolwich Dockyard, and fitted in H.M.S. "NIOBE," 1867.

293. Half-section (on a $\frac{1}{2}$ -in. scale) of about 50 ft. of the midship part of H.M.S. "NYMPHE," launched 1866, showing the details of the ventilating arrangements on the plan of Dr. Edmonds, as adopted in that and other vessels.

- A. Ventilating trunks on each side of the ship, extending about three-fourths of her length, for withdrawing foul air from the bilges and lower deck.
- B. Holes, one in each opening, for ventilating the bilges.
- C. Holes, one in each opening, for ventilating the lower deck.
- D. Tubes for conveying the foul air from the trunks A to the hollow iron masts.
- E. Tubes for conveying the foul air from the trunks A to the funnel when it is up, or to the air casing round the funnel when it is down.

294. Sectional MODEL (on a $\frac{1}{4}$ -in. scale), showing the ventilating arrangements to engine room, stoke-hole, shaft, passage, &c., as generally adopted for ships in H.M. service. 1866.

295. Ventilating riding bitt on Harfield's plan. (This model will be found at Class VI., Division L., No. 327.)

CLASS V.—DIVISIONS J and K.

N.B.—There have been no models added to these Divisions since the Catalogue was published.

CLASS V.—DIVISION L.

SHOT-PROOF CONNING HOUSES, EVOLUTION
BRIDGES, &c.

383. Section (on a $\frac{1}{2}$ -in. scale) of H.M.S. "NIOBE," launched 1866, showing the evolution bridge, with stanchions and ladders, the voice pipes for communicating with the engine room, and also the telegraph arrangement, as generally fitted to ships in H.M. service. 1866.

384. MODEL (on a $\frac{1}{4}$ -in. scale) of a portion of H.M.S. "LORD WARDEN," launched 1865, showing the arrangement for giving protection to the officers in the conning house and on the bridge. Chatham Yard. 1865.

CLASS V.—DIVISION M.

MISCELLANEOUS FITTINGS WHICH CANNOT
BE CLASSED UNDER ANY ONE OF THE
PRECEDING HEADS.

404. MODEL (on a 1-in. scale) of a ship's dispensary, with all fittings, as generally adopted for ships in H.M. service. 1866.

405. Section (on a 1-in. scale), showing a ship's pantry, and all its internal fittings, as generally adopted for ships in H.M. service. 1866.

406. Section (on a $\frac{1}{2}$ -in. scale) of H.M.S. "NIOBE," launched 1866, showing the hammock berthing, with stanchions, wash boards, and brackets, rails, and battens for securing the hammocks; also shifting pieces over the ports, as generally fitted to ships in H.M. service. 1866.

CLASS VI.

Models of the various Articles and Appliances required
for Use on board Ship.

Divisions.

A.—Tanks.	O.—Pendulums, telegraphs for steering
B.—Pumps.	wheels and engine rooms, &c.
C.—Capstans.	P.—Time glasses.
D.—Windlasses.	Q.—Ships' compasses and binnacles.
E.—Screw jacks.	R.—Stoppers and shot plugs for iron
F.—Anchors, anchor stocks, &c.	and wooden ships.
G.—Buoys for anchors.	S.—Ships' lanterns for signalling,
H.—Chains, chain cables, &c.	fighting, &c.
J.—Shackles for chain cables.	T.—Galleys, condensers, and portable
K.—Compressors for chain cables.	furniture, &c.
L.—Bitts for chain cables.	U.—Lightning conductors.
M.—Life buoys, life rafts, &c. (See	V.—Miscellaneous articles and appli-
Boats, Class II.)	ances which cannot be classed
N.—Patterns of logs, and deep-sea	under any of the preceding
leads.	heads.

CLASS VI.—DIVISION A.

TANKS.

5. Four specimens, showing proposed improvements in the mode of fitting taps to deck tanks.

(a.) Tap No. 1 shows the fittings complete to deck tanks as hitherto supplied to the navy.

(b.) Tap No. 2 shows the proposed arrangement. The advantages claimed for the new plan (No. 2) are as follows, viz., 1st. The plate and bolts, which are unsightly in deck tanks, would be dispensed with. 2d. The tanks would not require to be taken to the smithery to be fitted. 3d. A saving would be effected on each tank in labour and materials. The principal feature in the improved plan is the square connected with the collar, which square is seated in a similar square cut in the tank to receive it, and which prevents its being unscrewed from the outside.

Proposed by Mr. Jones, Inspector of Tanks, Royal Victoria Yard, 1868; and ordered to be generally adopted.

CLASS VI.—DIVISION B.

N.B.—There have been no models added to this Division since the Catalogue was published.

CLASS VI.—DIVISION C.

CAPSTANS.

98. MODEL of the capstan used in the French Imperial Marine at the present time (1866), commonly known as the "Barbaton Capstan."

It is only capable of working one sized chain.

99. MODEL of a capstan fitted with Gordon's sprocket wheel for working a chain messenger. This was the plan adopted in H. M. Service prior to the improved capstan invented by Messrs. Brown and Harfield about the year 1860. See Catalogue, No. 68., p. 169.

100. MODEL (on a 1-inch scale) of a single wrought-iron capstan and cable-holder, with adjustable stops, on the plan patented by Messrs. Harfield & Co., as fitted in H. M. ship "NIOBE," launched 1866, showing also the direct lead of the chain cable, deck rollers, &c., as fitted to ships of the Royal Navy. 1866.

CLASS VI.—DIVISIONS D and E.

N.B.—There have been no models added to these Divisions since the Catalogue was published.

CLASS VI.—DIVISION F.

ANCHORS, ANCHOR STOCKS, &c.

203. MODEL of an anchor, showing a plan for the two arms to be jointed at the crown so that they may both turn down flat upon the shank, but may turn back to a certain extent as the fluke enters the ground.

Proposed by Mr. Peter Dinzey, 1865.

CLASS VI.—DIVISION G.

N.B.—There have been no models added to this Division since the Catalogue was published.

CLASS VI.—DIVISION H.

CHAINS, CHAIN CABLES, SLIP HOOKS, &c.

261. MODEL of Saunders' patent safety anchor springs.

They are intended not to interfere with the ordinary use of the windlass, and when not in use to be stowed away in front of the bitts.

When the ship is riding in an exposed bay or roadstead the clutch-hook is to be fixed to the nearest convenient link of the cable, and a few inches of slack being given out from behind the strain is thrown upon the spring, which is to be 25 per cent. stronger than the cable, and by its elasticity to reduce the force of any sudden strain on both cable and windlass.

Proposed by Mr. Robert Saunders, 1867.

CLASS VI.—DIVISION J.

N.B.—There have been no models added to this Division since the Catalogue was published.

CLASS VI.—DIVISION K.

COMPRESSORS FOR CHAIN CABLES.

306. Part of a deck, showing a chain cable compressor, fitted to work with a vertical lever, on a plan in use in the French navy in 1865, but different from that adopted in H.M. Service.

307. Two MODELS of Messrs. Brown & Harfield's patent cable stoppers. A is the plan first proposed and used in H.M. Service prior to 1865. B is the improved plan which was afterwards adopted, and is commonly known as the "Elongated Bow Stopper."

CLASS VI.—DIVISION L.

BITTS FOR CHAIN CABLES.

327. Section (on a $\frac{1}{2}$ -inch scale) of the deck of H.M.S. "BELLEROPHON," launched 1865, showing the wrought-iron ventilating riding bitts, on the plan patented by Messrs. Harfield and Co., with the vertical web plates for connexion with the lower decks, as fitted in that and other ships, together with the chain cable, compressors, and controllers. 1866.

CLASS VI.—DIVISION M.

LIFE BUOYS, LIFE RAFTS, &c.

(See CLASS II.—DIVISION D.)

CLASS VI.—DIVISION N.

N.B.—There have been no models added to this Division since the Catalogue was published.

CLASS VI.—DIVISION O.

**PENDULUMS, TELEGRAPHS FOR STEERING
WHEELS AND ENGINE ROOMS, &c.**

360. Pendulum for showing the inclination of a ship for gunnery purposes. In this instrument the arc is transparent and lighted from behind to facilitate the reading being taken, and the pendulum is heavily weighted and travels on a rail.

Proposed by Mr. Henry Soper.

(This model will be found in the Catalogue at Class VI., Division O, No. 360, page 179.)

362. Protractor and gauge apparently to test the safe traverse of a gun, but it appears to be incomplete, and neither the name of the inventor nor any other particulars concerning it are known.

(This model will be found in the Catalogue at Class VI., Division O, No. 362, page 179.)

365. Clinometer for measuring the trim of a ship by the head or stern by means of a glass tube filled with a liquid.

Patented by Mr. Berthon.

(This model will be found in the Catalogue at Class VI., Division O, No. 365, page 180.)

366. Pendulum in brass circular case, with index to show the greatest inclination of a ship.

By Mr. A. G. Edye, Mate, R.N., 1836, who subsequently made a further improvement by adding to it an instrument for recording the number of rolls.

(This model will be found in the Catalogue at Class VI., Division O, No. 366, page 180.)

372. MODEL (on a scale of 4 inches to a foot) of a steering telegraph. The arms of the telegraph marked port and starboard are placed at different angles to show the man at the wheel the number of turns to be given. Thus, angle No. 1 is one turn port or starboard, angle No. 2 two turns, &c., horizontal "hard to port" or "starboard." If less than one turn of the wheel be required, any smaller angle than No. 1 can be shown, being previously understood by the man at the wheel. The arm not shown means "steady." The answer is given by a corresponding portable telegraph at the wheel.

Proposed by Mr. James Kiddle, master of the "ASIA," 1867. Ordered to be tried in the "MINOTAUR."

373. Plan for a Steering Telegraph or Signal, proposed by Mr. George Read. 1867.

(This model, and further particulars concerning it, will be found in the Appendix at Class VIII., Division B, No. 95, page 81.)

374. Section (on a $\frac{1}{2}$ -inch scale) of H.M.S. Niobe, launched 1866, showing the evolution bridge with the voice pipes for communicating with the engine-room, and also the telegraph arrangement, as generally fitted to ships in H.M. Service. 1866.

(This model will be found in the Appendix at Class V., Division L, No. 383, page 67.)

CLASS VI.—DIVISIONS P and Q.

N.B. There have been no models added to these divisions since the Catalogue was published.

CLASS VI.—DIVISION R.

STOPPERS AND SHOT PLUGS FOR IRON AND WOODEN SHIPS.

435. Four MODELS (A, B, C, and D), showing Plans for shot plugs.

Proposed by Mr. Evelyn, and forwarded to the Admiralty in 1865 by Mr. T. M. Rickman.

436. MODEL of a plan for stopping leaks and shot-holes in the bottoms of iron ships, by attaching a piece of thick felt to the outside surface of the bottom (and so covering the hole), by means of pneumatic brackets or suckers.

Proposed by Commander Warren, R.N. 1866.

437. MODEL of a flexible shot-plug.

Proposed by Mr. James Kiddle, Master of the "ASIA."
1867.

438. MODEL of a plan for stopping shot-holes and leaks in a ship, by fixing a hose over the hole, and carrying the upper end of the hose above the water-line.

Proposed by Mr. F. Pellatt. 1867.

CLASS VI.—DIVISION S.

SHIPS' LANTERNS FOR SIGNALLING, FIGHTING, &c.

460. Patterns (A. and B.) of a lamp-holder and a candle-holder, to be secured against iron or other bulkheads by means of a pneumatic bracket or sucker. A. is the candle-holder. B. the lamp-holder.

Proposed by Commander Warren, R.N. 1866.

461. MODELS (on a 1-in. scale), of a bow and a paddle-box, showing the light boxes; also a light box, full size, as generally fitted to the ships in H.M. Service. 1866.

CLASS VI.—DIVISION T.

GALLEYS, CONDENSERS, AND PORTABLE FURNITURE, &c.

493. Plan of a distilling condenser, in which a number of plates are substituted for the tubes in the condensers at present in use. The inventor claims for it the advantages of cheapness, durability, and greater facility for repairs, and that it has one-third more condensing surface.

Proposed by Mr. J. S. Hargrave, copper-smith in Sheerness Factory. 1866.

494. MODEL of the seamen's mess shelves, as fitted on board the "PLOVER," twin-screw gun vessel of 663 tons, at Deptford Dockyard, 1867, and other ships in H.M. Service.

495. Section (on a 1-in. scale) showing the seamen's shelves, plate racks, &c., as generally fitted in the ships in H.M. Service. 1866.

496. Section (on a 1-in. scale) of H.M.S. "NIOBE," launched 1866, showing the seamen's bag racks, and the method of securing the mess tables and stools thereto, as generally fitted to the ships in H.M. Service. 1866.

CLASS VI.—DIVISION U.

LIGHTNING CONDUCTORS.

505. Section (on a $\frac{1}{2}$ -in. scale,) showing the method of fitting the lightning conductors to the masts, in connexion with the ship on the plan of Sir William Snow Harris, and adopted for all ships in H.M. Service. 1866.

CLASS VI.—DIVISION V.

MISCELLANEOUS ARTICLES AND APPLIANCES, WHICH CANNOT BE CLASSED UNDER ANY OF THE PRECEDING HEADS.

520. Model of a gauge for sounding the depth of water in the hold of a ship. The proposal is to have a hollow tin cylinder with an index attached to it, to float in another hollow cylinder open at the lower part, so that the water in the hold, if any, may rise to its level, bringing up the index of the gauge, which may then be read off.

Proposed by Mr. Gillson, 1861.]

CLASS VII.

Models of the various Articles in connexion with the
Armament of Ships.*Divisions.*

- | | |
|--|---|
| A.—Carronades, with the carriages, slides, tackle, &c. | E.—Shields, and plans for working guns in them. |
| B.—Broadside guns, with the carriages, slides, tackle, &c. | F.—Plans for loading guns, cleaning and transporting them, &c. |
| C.—Pivot guns, with the carriages, slides, tackle, &c.; also the arrangements in connexion with the bulwarks to enable guns to be fired clear of them. | G.—Rifles, bayonets, and other small arms, and the fittings for them. |
| D.—Mortars or bombs, with the beds, carriages, &c. | H.—Shot, shell, rockets, tubes, fuzes, torpedoes, &c., and the fittings for them. |
| | I.—Plans for heating shot and carrying the same. |

CLASS VII.—DIVISION A.

CARRONADES, WITH THE CARRIAGES, SLIDES,
TACKLE, &c.

21. Section (on a $\frac{1}{2}$ -in. scale) showing a ship's port, with plates, bolts, sweep pieces, and other fittings for carronades, as generally adopted for ships in H.M. service, 1867.

CLASS VII.—DIVISION B.

BROADSIDE GUNS, WITH THE CARRIAGES,
SLIDES, TACKLE, &c.

91. Pattern screw for securing to the decks the metal curbs upon which $6\frac{1}{2}$ -ton, or 12-ton guns are to traverse.

Proposed by the Chatham officers, and adopted for the "LORD WARDEN" and "BELLEROPHON," in 1865.

92. MODEL (on a 1-inch scale) of a Rodman 15-inch gun, (American,) and carriage showing a plan for working heavy guns on the broadside.

Proposed by Capt. Ericsson of the United States of America in 1866.

93. MODEL shewing proposed mode of fitting the breeching bolts for securing the 12-ton guns, and also proposed position of eye-bolts for the side tackles in "BELLEROPHON," launched in 1865.

Proposed by the Chatham Officers 1865, and adopted with certain modifications.

94. MODEL (on a $1\frac{1}{2}$ -inch scale), showing a $6\frac{1}{2}$ -ton gun (marked A) mounted on the iron gun-carriage originally proposed by Captain R. A. E. Scott, R. N., for enabling heavy guns to be worked on the broadside. This plan with some slight modifications is that now (1868) generally adopted for all $6\frac{1}{2}$, 9, and 12-ton guns in the Royal Navy. The model also shows a proposed oval form of port for enabling a 12-ton gun (marked B) to be worked without increasing the size of the aperture.

Proposed by Captain R. A. E. Scott, R.N., in 1864, and ordered to be generally adopted for ships in H.M. Service.

95. Section (on a $\frac{1}{2}$ -inch scale) of a ship between decks, showing the ports and a $6\frac{1}{2}$ ton gun in position, with the ring, and shackle eyebolts to ports, training and rear tackle bolts and sockets in deck, dismounting cranks and bolts, muzzle lashing bolts, and all others; also the cranks and, hooks for stowing shell, grape, and canister boxes, sponge, stores, &c., as generally fitted to ships in H.M. Service.

1867.

96. MODEL of a part of the side of H.M.S. "Hercules," built 1868, with an 18-ton gun mounted, showing the amount of squaring of port and training of the guns which can be obtained at extreme elevation and depression.

Proposed by the Chatham Officers in 1866, and adopted with slight modification.

(This Model will be found at Class V., Division G., No. 207, Appendix, page 63.)

CLASS VII.—DIVISION C.

PIVOT GUNS, WITH THE CARRIAGES, SLIDES, TACKLE, &c., ALSO THE ARRANGEMENTS IN CONNEXION WITH THE BULWARKS TO ENABLE GUNS TO BE FIRED CLEAR OF THEM.

126. Two MODELS (A and B) of a plan for working guns.

(A.) represents a plan for loading and pointing the guns on the main deck of a vessel, then raising them by steam or other power through a circular aperture in the centre of the ship to the upper deck where the piece is run out and fired, and when at full recoil, lowered again to the main deck to be reloaded. Iron shutters are employed to close the aperture whilst the gun is below, and thus protect the men from splinters or the debris of shell. A pamphlet accompanies the model.

(B.) represents the same plan applied to a Land Fort.

Proposed by Capt. E. A. Inglefield, R. N., 1860.

127. MODEL of a plan proposed by Capt. King Hall, C.B., Superintendent of Sheerness Dockyard, to admit of a vessel of the "Favorite" class (launched in 1864), firing two guns forward and two aft inside her battery, and in a line with the keel. 1866.

128. Section (on a $\frac{1}{2}$ -inch scale) showing the upper deck of a ship, with a $6\frac{1}{2}$ -ton pivot gun in position, with radius and other plates, sockets, bolts, &c., as generally fitted to ships in H.M. Service. 1867.

129. MODEL showing a plan for a portion of the topside of H.M.S. "PENELOPE," launched in 1867, to be made removable so as to allow the main deck guns to be fired nearly in a fore and aft line.

Proposed by the Pembroke Officers. 1865.

CLASS VII.—DIVISION D.

N.B.—There have been no Models added to this Division since the Catalogue was published.

CLASS VII.—DIVISION E.

SHIELDS, AND THE PLANS FOR WORKING THE GUNS IN THEM.

173. Plan for fighting guns under a shield placed on a turntable. Proposed by Mr. J. Money Penny, 1864.

174. MODEL (on a $\frac{1}{4}$ -inch scale) of a plan for protecting the lower part of a turret, by placing a circular belt of armour plating close against the turret instead of armour plating the ship's side; the model also shews (by removing the part marked A.) in the event of a portion of the side and deck of the ship being shot away, what support would remain for the cylindrical belt of armour plating.

Proposed by Capt. C. P. Coles, C.B. in 1866.

175. Sectional MODEL (on a 1-inch scale) of the after turret of the "ROYAL SOVEREIGN," converted to an iron-cased turret ship in 1864. Description as follows:

- (a) $\frac{1}{2}$ -inch iron tube-lining to port.
- (b) Radius iron beams. An aperture in top of turret, 6 ft. diameter for getting gun in and out.
- (c) $\frac{3}{4}$ -inch iron plating over beams.
- (d) Hook clamps riveted through top and beams.
- (e) Wood-wedges for additional security to upper part of armour plates.
- (f) An inner armour plate, 11 ft. 6 ins. by $4\frac{1}{2}$ ins., for additional strength to port.
- (g) Outer armour plate $5\frac{1}{2}$ inches thick.
- (h) Roller path.

This MODEL can be taken to pieces to show the construction. 1866.

176. MODEL of one of the original shields or cupolas designed by Captain Cowper Coles, R.N., C.B., built in 1859, and fired at on board the "TRUSTY," floating battery, in September 1861. Its form, as will be seen from the model, was conical; the cylindrical form was the one he afterwards adopted, as will be seen by referring to the model of the shield fitted in the "ROYAL SOVEREIGN." (See Class VII., Division E., No. 175, page 78, in the Appendix.)

The shield was struck 33 times, and at the conclusion of the firing it is stated that it worked with the same ease as before. Full particulars of the trial will be found in Parliamentary paper, No. 267, dated 11 May 1866.

CLASS VII.—DIVISION F.

N.B.—There have been no Models added to this Division since the Catalogue was published.

CLASS VII.—DIVISION G.

RIFLES, BAYONETS, AND OTHER SMALL ARMS,
AND THE FITTINGS FOR THEM.

223. One box with patterns, and three models descriptive of the various fittings for small arms, cutlasses, spare breechings, &c., for the fighting decks of ships of war; ordered to be generally adopted with a view to a uniform system. 1854.

224. Two MODELS (A & B) shewing two plans for arm stands. A shews the plan formerly in use, B the improved plan proposed by Capt. A. C. Key, and ordered to be generally adopted in 1863.

CLASS VII.—DIVISION H.

SHOT, SHELLS, ROCKETS, TUBES, FUZES, TORPEDOES, &c., AND THE FITTINGS FOR THEM.

270. MODEL (on a 1-inch scale) of an apparatus for firing 10-pounder war rockets from vessels, without permitting the back fire to enter the ship.

Proposed by Mr. W. Hale, in 1845, and tried on board H.M.S. "EXCELLENT" and at Shoeburyness in 1846.

271. Two full-sized MODELS. One of the common shell for a 7-inch muzzle-loading rifled gun, and one of the hollow bodied shot for the same gun. 1866.

CLASS VII.—DIVISION J.

N.B.—There have been no Models added to this Division since the Catalogue was published.

CLASS VIII.

Models of Steering Apparatus, permanent or temporary,
with Stern Posts, Braces, and Pintles.

Divisions.

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| <p>A.—Plans for permanent rudders, or permanent substitutes for rudders.</p> <p>B.—Plans for temporary or spare rudders.</p> | <p>C.—Plans for securing the rudder to the ship.</p> <p>D.—Plans for working and locking the rudder.</p> |
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CLASS VIII.—DIVISION A.

PLANS FOR PERMANENT RUDDERS, OR PERMANENT SUBSTITUTES FOR RUDDERS.

46. Plan for steering ships by means of two rudders, one on each side of the ship, so fitted as to slide in and out.
Proposed by Mr. F. Martin, Assistant Master Shipwright, Sheerness. March 1862.

47. MODEL of steering apparatus, in which the rudder-post and bar are protected from shot, and the rudder is deep in the water. The model is divided into three portions—1st, the stern post; 2nd, the rudder which is intended to be of iron; 3rd, the plank to cover the bar of the rudder, which will work in the groove of the stern-post. In iron-clads the plank would not be used, but in lieu thereof the stern-post and bar of the rudder would be covered over with an iron casing of the same thickness as other parts of the ship. The model presumes that the ship draws twenty-one feet of water at her deep load line, and it is proposed that the bar of the rudder should be encased for one-third of that distance below the water, and the rudder itself should at the top be one third of the ship's draught from the surface of the water.

Proposed by Mr. G. S. Dracopule. 1867.

48. MODEL (on a $\frac{1}{2}$ -in. scale) of the balance rudder of H.M.S. "BELLEROPHON," launched in 1865, shewing the tiller and yoke with tiller-ropes and blocks, the paul or locking plate, and plate to secure the tiller &c.; also the rudder pendants and other fittings. 1867.

49. Plan for putting together the main piece of a rudder in three parts instead of making it out of one log, proposed to meet the difficulty at one time experienced in getting large pieces of English oak timber suitable for line-of-battle ships' rudders. To prevent the working of the Norman Head separating the pieces at the joint, a spider hoop, $1\frac{3}{4}$ ins. thick, is to be let down over the head, bolted through and firmly clenched.

Proposed by Mr. G. Rutter, Acting Timber Converter, Pembroke Yard. 1860.

50. MODELS, (four in number, *a*, *b*, *c*, and *d*), of a twin balanced rudder, intended to give a better effect in steering, with a great reduction of power employed.

- (*a*) represents the twin balance rudder as fitted to a steam ship in the usual place abaft the propeller.
- (*b*) represents the rudder fitted to a steam ship before the propeller.
- (*c*) represents the rudder fitted to a sailing ship.
- (*d*) is a whole model of a ship with the twin balance rudder fitted to it, but in a somewhat different manner from that in which it is applied in the other models.

Presented by the inventor, Mr. Samuel Clarke. 1868.

CLASS VIII.—DIVISION B.

PLANS FOR TEMPORARY OR SPARE RUDDERS.

95. MODEL of a temporary rudder and temporary stern post to be kept ready on board a ship, to be lowered when wanted over the ship's side, with a bearing on the deck; or if two such rudders were carried, they might be worked on the mizen channels. It is also proposed to place on the rudder head a sort of lantern, at such a height as to be seen above the bulwarks. The lantern is to turn with the rudder, so as to exhibit an illuminated S. when the helm is starboard, and P. when the helm is port, and M. when amidships, so that any other vessels approaching would see which way the ship is steering. By daylight large printed letters would be used instead of the lantern arrangement.

Proposed by Mr. George Read, officer in the Coast Guard Service, Deal 1867.

CLASS VIII.—DIVISION C.

N.B.—There have been no models added to this Division since the Catalogue was published.

CLASS VIII.—DIVISION D.

PLANS FOR WORKING AND LOCKING THE
RUDDER.

177. MODEL of a plan to enable the man at the wheel to check the rudder in case of the wheel ropes or tiller being carried away.

Proposed by Mr. J. C. Dixon, in 1865.

178. MODEL of a plan for steering ships in the following manner:—An iron shaft or rod passes completely through the body of the rudder over its after part; the shaft extends up through the counter and deck, where it is put in communication with gear attached to the steering-wheel which will make it revolve; the lower end of the rod comes out below the rudder, and has on it a small cog wheel. On the stern post, below the rudder, is fitted an iron or metal open frame, in the form of a quadrant of a circle, on the outer part of which there are teeth corresponding to the cogs in the small wheel just referred to; when the shaft is made to turn round it travels by means of the cogs along the circular arc, carrying the rudder with it.

Proposed by Mr. Peter Dinzey. 1865.

179. MODEL (on a $\frac{3}{4}$ -in. scale) of a plan for steering below the water-line for vessels of the "PLOVER" class, built 1866, or to be applied with suitable modifications to any other classes of ships in the navy.

Proposed by Mr. William Ord, Foreman of Fitters, Portsmouth Dockyard. 1867.

180. MODEL (on a 2-in. scale) of the wheel stanchions and steering wheel complete, with index plate and all fittings, as fitted in H.M.S. "BELLEROPHON," launched in 1865, and other ships of the Royal Navy. 1867.

181. MODEL of Fayrer and Robinson's patent safety steering wheel. This invention is intended to prevent the risk of having the wheel upset, or of the loss of the rudder, either from a violent stroke of the sea, or when the ship happens to have stern way. The helmsman is to step on the pedal; and by bringing the compressing band into action he may fix the wheel and rudder as firmly for the time as if they were always immoveable; and then as he relieves the pressure by easing up his foot the wheel becomes free. The apparatus, however, is intended to be so controllable that whenever requisite a dead lock may be avoided, and any lessened resistance applied. The pedal, as will be seen by a reference to the model, acts by powerful leverage upon what is termed the compressor, which is made of gun metal or wrought iron.

Description of the several parts.

- A. Compressor band. Metal.
- B. Compressor band. Wood attached together.
- C. Compressor wheel fixed to and turning with barrel of steering wheel. Wood.
- D. Tangent screw regulating any expansion, contraction, or wear of bands. Metal.
- E.E. Levers and foot pedals to act on bands. Metal.
- F. Balance weight suspending action on bands. Metal.
- G.G. Fulcrum of levers. Metal.

Proposed by Commander Fayrer, R.N. 1865. Fitted for trial in the "NIOBE" at Woolwich.

182. Steering apparatus for steamers and sailing vessels.

Proposed by Mr. John Roberson. 1841.

CLASS IX.

Models of various Plans for the Propulsion of Ships.

Divisions.

- | | |
|---------------------------------------|---|
| A.—Plans for paddle-wheel propellers. | C.—Miscellaneous plans in connexion with the propulsion of ships. |
| B.—Plans for screw propellers. | |

CLASS IX.—DIVISION A.

PLANS FOR PADDLE-WHEEL PROPELLERS.

18. MODEL of a central paddle-wheel, by which the inventor states the following advantages are to be obtained over the screw, viz.: 1st, It does not interfere with the steering of the ship. 2nd, A ship in action losing any of her spars, they fall over the side, and are almost certain to come in contact with the screw; with the centre paddle this is impossible. 3d, The screw may be injured by shot, the paddle can be protected. 4th, With a screw you cannot with certainty back astern, with the paddle you can. 5th, A ship under canvas would scarcely feel the impediment of the paddle, when the screw is always a drag. 6th, The centre paddle could easily be disconnected and allowed to revolve, and when necessary readily lifted up out of the shaft; and lastly, the body of water contained in the shaft would certainly prevent the ship rolling.

Proposed by Mr. R. Dawson. 1866.

19. MODEL of a new method of propelling ships, proposed by Major Scott Phillips, 1867. (The models will be found at Class I., Division A, Nos. 183 and 184, Appendix, page 10.)

20. MODELS (three in number, *a, b, c,*) to illustrate a plan for propelling ships by constructing them with double sterns, and fixing a wheel or wheels between the two deadwoods. The wheel is intended to be immersed nearly up to its centre, and surrounded by a casing.

Proposed by Captain Ward, 1868.

21. Half Block Model (on an $\frac{1}{4}$ in. scale) of a vessel, showing a plan for propelling ships by means of floats similar to those of the ordinary paddle-wheel, but attached to an endless chain passing over two rollers.

The name of the inventor of this plan and the date are not known.

CLASS IX.—DIVISION B.

PLANS FOR SCREW PROPELLERS.

40. MODEL of a screw propeller having the blades perforated with holes, by which it was supposed that the following advantages would be obtained, viz.: Less slip, less vibration, less weight, and less cost, with the same strength.

Proposed by the Hon. Major Fitzmaurice, 1865.

41. Plan to enable a screw, having only one bearing, to be feathered from inboard.

Proposed by Mr. John Farquharson, leading man of storehouses, Sheerness dockyard, 1867.

42. MODEL of a screw propeller designed to be used either as a four-bladed or two-bladed screw. 1860.

43. Two MODELS *a.* and *b.* illustrative of the difference between single and double screws, and indicating the mode in which they are made.

Presented by Mr. John Dinnen, R.N. 1860.

44. Model of a screw propeller designed to gain an increase of speed with a smaller expenditure of coal, and to diminish the vibration. The inventor states that the screw has a blade of circular outline in which the area originally employed is maintained, and a boss which tapers from the size of the forward bracket, to that of the after one, and is a continuation of the ship's run, and that from the form of the screw, also the aperture for the screw well might be smaller than with the ordinary or Griffith screw, and the ship's stern therefore stronger.

Proposed by Mr. David Rule, leading man of pattern makers, Keyham Yard. 1862.

CLASS IX.—DIVISION C.

MISCELLANEOUS PLANS IN CONNEXION WITH
THE PROPULSION OF SHIPS.

59. MODEL of a ship's propeller, stated to be superior either to screw or paddle. It is proposed to be fixed in the stern of the ship below the water line, and connected by a shaft to the machinery in the ship; the propeller slides horizontally out and in, and as the casement or tube is occupied by the propeller it is emptied of the water, as it is filled with the water it is freed from the propeller, both in their turn acting as propeller powers.

Proposed by Mr. Robert Hamilton. 1866.

CLASS X.

Masts and Rigging.

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| <p>A.—Model showing the rig of vessels at various periods.</p> <p>B.—The masts, yards, tops, cross-trees, trestle-trees, caps, &c., according to the classification of Sir W. Symonds in 1836.</p> <p>C.—Plans for stepping lower masts.</p> <p>D.—Plans for raising, lowering, and fidding topmasts, topgallant masts, &c.</p> <p>E.—Plans for making, strengthening, and fitting lower masts.</p> <p>F.—Plans for making, strengthening, and fitting topmasts, topgallant masts, &c.</p> <p>G.—Plans for making, strengthening, and fitting bowsprits.</p> <p>H.—Plans for making, strengthening, and fitting gaffs and booms.</p> | <p>J.—Plans for making, strengthening, and fitting yards.</p> <p>K.—Plans for mast-heads, tops, cross-trees, trestle-trees, and caps.</p> <p>L.—Plans for fitting channels, shrouds, and stays, including deadeyes, hearts, thimbles, and hooks.</p> <p>M.—Blocks and sheaves.</p> <p>N.—Specimens of rope, &c., for rigging.</p> <p>O.—Specimens of canvas for sails.</p> <p>P.—Models of masts, &c., showing the damage sustained by them in engagements with the enemy.</p> <p>Q.—All models in connexion with masts and rigging not included in the foregoing divisions.</p> |
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CLASS X.—DIVISION A.

MODELS SHOWING THE RIG OF VESSELS AT VARIOUS PERIODS.

9. MODEL (on a $\frac{1}{4}$ -inch scale) of the rig of a ship with *tripod* masts.

The model shows the tripod legs as in H.M.S. "WIVERN," launched 1863, not passing through the upper deck.

It is proposed in action not to send topgallant masts on deck, but to lower them down until landed in the top, when the fid can be put in. The topgallant masts when thus housed, being abaft all, would not interfere with the topsails.

The trysail mast is of wood.

A Cunningham topsail might be used if preferred. One of the principal objects in these masts is to have as little rigging aloft as possible when going into action. The topgallant and royal rigging should be sent down and everything unreefed except the gear actually necessary for working the topsails and fore and aft sails in action. These ropes in

a regular seagoing ship should be led down through and alongside the masts and legs to the deck below, so as to work the topsails without exposing the men.

The shrouds with ratlings are not intended for support, but merely for the men to go aloft by.

Proposed by Captain Cowper Coles, C.B. 1865.

A fully rigged model of a ship with *tripod* masts will be found at Class I., Division A., No. 156, page 53 in the Catalogue.

CLASS X.—DIVISIONS B and C.

N.B.—There have been no models added to these divisions since the catalogue was published.

CLASS X.—DIVISION D.

PLANS FOR RAISING, LOWERING, AND FIDDING TOPMASTS, TOPGALLANT MASTS, &C.

265. MODELS (two in number, *a* and *b*) descriptive of a plan for introducing top ropes for fidding and unfidding topmasts instead of toptackle pendants and falls. The advantages proposed to be gained by the plan are that it would reduce weight, be less expensive, and afford greater facility for getting top-masts up and down.

Proposed by Captain Edmonstone, of the Steam Reserve, Devonport, and fitted for trial in the "DONEGAL," "ZEALOUS," and "PRINCE CONSORT."

266. MODELS (twelve in number, *a* to *l*) showing a mode of fitting the heels of topmasts with an iron band and portable iron bolt, for the purpose of preventing the splitting of the heel of the topmasts, and the top rope from slipping out.

Proposed by the Devonport Officers, and ordered to be generally adopted. 1866.

CLASS X.—DIVISIONS E, F, and G.

N.B.—There have been no models added to these divisions since the catalogue was published.

CLASS X.—DIVISION H.**PLANS FOR MAKING, STRENGTHENING, AND FITTING GAFFS AND BOOMS.**

440. Rough MODEL of suggested improvements in the manner of fitting the trusses in the Indian troop ships of the "CROCODILE" class, also of fitting the gaffs of fore and aft sails generally.

Proposed by the Portsmouth Officers, 1866. Adopted for "CROCODILE," "SERAPIS," "JUMNA," "EUPHRATES," and "MALABAR."

CLASS X.—DIVISION J.**PLANS FOR MAKING, STRENGTHENING, AND FITTING YARDS.**

491. Sample of the steel used by Messrs. Westwood Baillie and Co. in the construction of steel yards.

Received from Mr. Baskcomb. 1866.

CLASS X.—DIVISION K.**PLANS FOR MASTHEADS, TOPS, CROSS-TREES, TRESTLE-TREES, AND CAPS.**

562. MODEL (on a 1-in. scale) of a plan for making iron caps in two parts. The after part of the cap to be made separate, and shrunk on the masthead as usual. The neck or collar of the cap to be made with "he" or "she" joints, with a slot or keyhole through them. The fore

part of the cap to be made separate, and fitted with key holes, &c., to the after part, already shrunk on the mast-head. A tapering key to be driven from the upper side of cap, through the two parts which would make a solid bearing and a dead lock. The sides to be secured with screws, as shown in MODEL.

The fore part of cap could be removed by taking out the key and screws, and then, by securing a studding sail boom or pole on the trestletree, with some 6 or 7 ft. above the masthead, and attaching a tackle the fore part of cap can be lowered down, and by the same process put in place again.

Proposed by Mr. Thomas Pattison. 1868.

CLASS X.—DIVISION L.

PLANS FOR FITTING CHANNELS, SHROUDS,
AND STAYS, INCLUDING DEADEYES,
HEARTS, THIMBLES, AND HOOKS.

636. Pattern of a spring hook and thimble to be used instead of lashings for jib and staysails.

Proposed by Mr. Balant. 1865.

637. Section (on a $\frac{1}{2}$ -in. scale) showing the channels, with the deadeyes and preventer plates, as generally fitted to ships in the Royal Navy. 1867.

CLASS X.—DIVISION M.

N.B.—There have been no models added to this division since the Catalogue was published.

CLASS X.—DIVISION N.

SPECIMENS OF ROPE, &c. FOR RIGGING, &c.

737. Specimens of cordage made by a machine, proposed by Mr. W. Hago, in 1865.

738. Further specimens of cordage made by the machine, proposed by Mr. W. Hago, in 1865. (See No. 737.)

CLASS X.—DIVISIONS O and P.

N.B.—There have been no models added to these divisions since the Catalogue was published.

CLASS. X—DIVISION Q.

ALL MODELS IN CONNEXION WITH MASTS AND RIGGING NOT INCLUDED IN THE FORE-GOING DIVISIONS.

824. MODEL showing a plan for enabling a double topsail (i.e. two sails) to be set on one topmast. The lower mast is given an additional length from the hounds to the cap, so that the yard for the lower or cap topsail, may be set on the cap of the lower mast, and the sail extend down to the lower yard. The yard of the upper topsail is set as usual, but this sail extends only as far down as the cap of the lower mast.

One of the principal advantages to be derived from this plan is that a vessel could go into action with her topmasts struck, and yet have her topsails (cap-topsails) set.

One or more of the masts of the "Hector," "Resistance," "Defence," "Valiant," "Minotaur," and other vessels were so fitted about the year 1861.

In this model the upper topsail is shown to be reefed from the deck on Cunningham's plan, but it is not necessarily so fitted.

CLASS XI.

Arrangements for launching Ships, hauling them up, heaving them down, raising them in Floating Docks, &c.

(For Dry Docks, see Class XII., Division B.)

12. Sectional floating dock. This dock is made up of a number of separate pontoons or camels placed side by side. Each section is in the form of a long rectangular watertight box, having a framework rising at each end to form the sides of the dock when the various sections are put together. At each end of each section there is a separate float or tank. These floats are attached to the section by gearing in such a way that the section itself may have water admitted into it and be sunk to any required depth. When a ship is to be docked on this apparatus, a sufficient number of the sections are placed side by side, and blocks prepared in a line across the middles of the sections; water is then let into the sections, and the dock lowered by means of the end floats to the proper depth to admit the ship, the floats giving stability to the whole while the pontoons are under water. The ship is then placed over the blocks and shored to the frames at the ends of the sections; the water is pumped out of the sections by steam pumps carried on the dock, and the dock, with the ship on it, rises until the vessel and the upper parts of the sections are above the water.

This plan was proposed in 1859 by Mr. Warder, late draughtsman in the office of the Controller of the Navy, and is a modification of a dock of American origin. The model is in two parts (A. and B.) A. represents one end of one section of the dock, and B. one end float.

(See Catalogue, Class XI., No. 12, page 245.)

13. A set of MODELS, seven in number, (*a*, *b*, *c*, *d*, *e*, and *f*), of a design for a floating dock for Bermuda.

(*a*.) Is a model (on a $\frac{3}{16}$ -inch scale) of an iron floating dock, designed by Mr. Jas. Campbell, of the firm of Campbell, Johnstone, & Co., engineers and

shipbuilders, Silvertown, Essex. The dock is designed to lift vessels of the "MINOTAUR" class with a displacement of about 10,000 tons; it is divided into 54 watertight compartments, formed by seven longitudinal decks, 10 watertight transverse bulkheads, and by the outside and inside skins. These compartments consist of load or upper chambers, balance or middle chambers, and air or lower chambers, for the several operations of raising or sinking required in docking ships; its most important feature is that it can be careened by filling the load or upper chambers on one side with water, which brings the middle line or keel some 5 feet out of the water.

- (b.b.) Are caissons for the model (a.), and are placed in the ends of the dock before the vessel in the dock can be made dry.
- (c.) Is a model of a ship of the "MINOTAUR" class, and weighted to a corresponding displacement, so as to be used in the model (a.)
- (d.) Model of a tray or pontoon to be used in the model (a.) for the purpose of docking smaller vessels. These trays are sunk in the dock and a small vessel is hauled over it, when it is raised by the dock, emptied, and then floated out with the vessel on it, so that as many vessels may be docked and under repair at one time as there are trays.
- (e.) Model of a small vessel (say with 1,200 or 1,400 tons displacement) to be used with the tray (d.)
- (f.) Tank for working the models in.

This dock, with some slight modifications, is now (1868) being built by Messrs. Campbell, Johnstone, & Co. for the Admiralty, and will be stationed at Bermuda.

14. A set of MODELS, eight in number, (a, b, c, d, e, and f,) of a design for a floating dock for Bermuda.

- (a.) Is a model of an iron floating dock on a $\frac{1}{16}$ -inch scale, designed by Mr. Campbell, and capable of docking vessels of the "MINOTAUR" class, differing from the design shown in model No. 13, inasmuch as it is arranged to be heeled by means of spars instead of by watertight compartments erected on the upper part.
- (b.b.) Caissons.

- (c.c.) Section of the dock (a.), fitted to illustrate the method of heeling it over for repairs by means of spars.
- (d.d.) Two spare sets of spars for heeling over.
- (e.) Tray or pontoon similar to the model (d.) in the preceding set of models.
- (f.) Model of a small ship to illustrate the working of the tray (e.)

15. Series of MODELS (three in number, *a*, *b*, and *c*) illustrating the arrangements, part of which only were carried out, for hauling up at Haslar the gunboats which had been built for the Russian war.

- (a.) MODEL (on a $\frac{1}{50}$ -inch scale) representing the proposed general arrangements of the premises. The parts actually constructed were the longitudinal slipway about the centre of the yard, up which the boats are hauled, the transverse slipway at the top of the longitudinal slipway, along which the vessels are moved to take them to their berths. This was, however, only completed from the end next to Haslar Bridge, as far as the line A. The row of slips above this transverse slipway was also constructed with roofs over each, from the end next Haslar Bridge as far as the line B., and without roofs from B. to C.

The model also shows the following proposals which have not been carried out, viz., a number of buildings, &c., proposed to be erected for the repair of the hulls and machinery of the gunboats if injured during war; also some launching slips at the Haslar Bridge side, which were proposed to be constructed for launching several of the boats at once direct from the blocks, if urgently required for immediate service.

The model also shows a proposal for damming back the water and forming a large basin, by which means the vessels might be launched at any state of the tide from the main slipway.

- (b.) Working MODEL (on a $\frac{1}{2}$ -inch scale). The lower part represents the transverse cradle and a portion of the transverse slipway, shown in model (a.), by means of which the boats after being hauled up the main slipway are moved along to the slips on which they are to be finally placed; it also shows

the method of hauling the boats on or off the transverse cradle by means of an endless chain to be worked by an engine:—the motion to be reversed by reversing the bolt or catch fixed in the piston. A screw was, however, substituted for this chain in the arrangements finally adopted.

The upper part of the model represents one of the slips on which the boats are placed, and one of the cradles used for moving them. This cradle is constructed in two parts, so that after the boat has reached its destination, by drawing out the transverse timber slides the cradle may be removed, and the vessel be left resting on the blocks. A model of a boat is also shown on the cradle, with one of the temporary roofs proposed for those vessels for which the permanent roofs had not been constructed.

(c) Working MODEL (on a $\frac{1}{6}$ -inch scale) of a proposed method for launching the gunboats at Haslar by means of an hydraulic lift. The vessel was to be either put on blocks on the hydraulic frame or on the upper cradle. In either case the arrangements were to be so made that a vessel would be ready to be put on as soon as the hydraulic frame was adjusted to the proper level. For letting down or launching a vessel it would be only necessary to turn off the water from the cylinders. It was supposed that the operations of launching a vessel and floating her from the camber need not occupy more than five minutes, and that the lift could be raised again to receive another vessel in about a quarter of an hour; and that two vessels an hour might be launched by this method. The model shows the upper cradle working on the lift. 1856.

16. Series of MODELS, four in number (*a*, *b*, *c*, and *d*), illustrative of a proposal for hauling up ships on slips, in order the better to preserve them from decay, and to leave more space available in the harbours.

Proposed by Mr. Scamp, Deputy Director of Works to the Admiralty about 1850.

(a) MODEL (on a $\frac{1}{6}$ -inch scale) showing the general arrangement proposed with three rows of slips, the two higher ones being intended for ships in ordinary or requiring large repairs, and the lower

row for advanced ships, or those preparing for commission. On the plan shown by this model the ships are proposed to be hauled up an incline of 1 in 35, on a longitudinal cradle, worked by an engine. The proposed positions of the houses, workshops, and machinery for the fitting and repair of the ships are also shown.

(b.) MODEL (on a $\frac{1}{50}$ scale) representing a modification of the arrangement shown in the preceding model; viz., to dispense with the inclined plane, and instead thereof to raise the vessels in the following manner—that is, to place the vessel in a dock, and then to pump in water sufficient to float the vessel on to a cradle placed at the required level.

(c.) WORKING MODEL, on an enlarged scale ($\frac{1}{8}$ inch to a foot), of a portion of model (a.); viz., 10 of the slips on the two upper rows, a portion of the transverse slipway with the cradle on it, two of the slips on the lower row, and the whole of the longitudinal slipway, the two cradling docks, viz., the upper and shallower one for smaller vessels, and the lower and deeper one for larger vessels, and the caisson at the entrance of the lower dock on the principle introduced by Mr. Scamp, viz., to slide in and out of a groove of solid masonry, instead of having to pump the water in and out as formerly.

The Model also shows at the upper end a portion of the roof proposed to be erected over the ships, also three models of ships hauled up, the centre one, a 3-decker, being a model of the "ROYAL ALBERT."

The Model of the "ROYAL ALBERT" is shown on the longitudinal cradle, which is in two parts, united by transverse timbers which are intended to be drawn out when the ship reaches its position, and thus allow the cradle to be removed.

The ship, after being docked and placed on the longitudinal cradle, is drawn up till it reaches the transverse slipway, when the longitudinal cradle, with the ship on it, is placed on the transverse cradle, and is then drawn along the transverse slipway by an engine fixed at the side, till it reaches the slip on which the ship is to remain.

It is removed from the transverse cradle to the slip by the means shown in the next model (16 d).

- (d.) Working MODEL (on a 1-inch scale) of a section of one of the upper slips referred to above, showing a proposal for the vessels to be drawn off the transverse cradle on to their slip by means of an endless chain passing over rollers. On reaching its position the long shores for holding her in position on the slip are fixed, and the shores supporting her on the cradle are knocked away, leaving the vessel resting on the blocks; the cradle could then be removed. This model also shows a proposed arrangement of wedges by means of which, when it is required to remove the wedges which cause the blocks to take the ship, they may easily be driven out, and the blocks set free, by driving in the other system of wedges, shown in the model in the first set of blocks.

17. MODELS (on a $\frac{1}{4}$ -inch scale), two in number (*a* and *b*), of Clarke's Hydraulic Lift, for raising first-class ships of war.

- (a.) Represents the Lift itself, showing the altars, blocks, shores, &c., and the sliding caissons at the entrance. The Lift is intended to be raised by hydraulic power.
- (b.) Represents what is commonly called a "Saucer," "Pontoon," or "Tray," which is used in the following manner:—The dock with the saucer in it having been lowered to a sufficient depth, the ship is floated on to the saucer; the dock and saucer are then raised by means of pumps sufficiently to allow the water to run out of the saucer through the open valves; the valves are then closed, the dock again lowered a few inches, and the saucer, with the ship on it, put afloat, independent of the dock, leaving the dock available for docking a ship, or for repeating the same operation again with another saucer. When the ship has been repaired, and is to be removed from the saucer, they are again placed in the floating dock to be lowered and the ship set afloat.

18. Two MODELS (A. and B.) illustrative of plans to overcome friction in moving heavy bodies, as for instance, in hauling up ships or afterwards placing them afloat again. 1862.

Proposed by Mr. Scamp, Deputy Director of Works. 1861.

19. MODEL (on a $\frac{1}{2}$ -inch scale) of a plan for launching vessels from a slip.

- (a.) Represents the slip, blocks, and transverse slipway on which the transverse cradle moves.
- (b.) Is the longitudinal slipway, down or up which the vessels are moved on the longitudinal cradle.
- (c.) Represents the longitudinal cradle with transverse tramways on the top corresponding with the transverse slipway.
- (d.) Represents the transverse cradle in five pieces, which is slipped under the vessel and fixed by the moveable timbers, as shown in the model.

Proposed by Mr. Scamp, Deputy Director of Works to the Admiralty. 1856.

20. MODEL (on a $\frac{1}{25}$ -inch scale) of a design for lifting vessels of about 3,000 tons, and laying them up on slips in a seagoing state, with the exception of ordnance stores, coals, water, and victuals, so as to be ready for sea at a short notice.

The proposed arrangement was as follows:—The vessel to be hauled up is first placed on a floating dock in deep water. The water is pumped out of the dock sufficiently to enable it, with the vessel on it, to be placed in shallow water over the permanent ways opposite the slip on which the vessel is to be hauled up. The dock is then lowered till it rests on the ways, when the vessel, being now on a level with the slip, is hauled off, and the dock is available for repeating the same operation with other vessels.

Designed by Mr. Scamp, Deputy Director of Works to the Admiralty. 1862.

(See Catalogue, Class XII., Division B., No. 30, page 247.)

CLASS XII.

Models of Buildings, Breakwaters, &c.

Divisions.

- | | |
|---|--|
| A.—Dockyards, Admiralty houses, hospitals, &c. | C.—Models of sheers, derricks, cranes, &c. |
| B.—Dry docks, basins, building sheds, timber sheds, &c. | D.—Breakwaters, &c. |
| | E.—Semaphores, beacons, buoys, &c. |

DIVISION A.

DOCKYARDS, ADMIRALTY HOUSES, HOSPITALS, &c.

4. General MODEL (on a $\frac{1}{30}$ -inch scale) of the harbours at Malta, showing the recent extension of the Great Harbour, with a proposed canal between the Great Harbour and the Quarantine Harbour. 1864.

5. MODEL (on a $\frac{1}{10}$ -inch scale) of the French and Dockyard Creeks at Malta, showing the position finally decided on for the new dock in French Creek. 1865.

6. General MODEL (on a $\frac{1}{10}$ scale) of the northern part of Devonport Dockyard, showing proposed alterations, and the space to be gained by excavating the rock north of saw mills, and the road to the south of the saw mills. 1845.

7. MODEL (on a $\frac{1}{2}$ -inch scale) of the fireproof storehouses erected at Devonport Dockyard. The outside walls are of brick, $22\frac{1}{2}$ inches thick. The roof, floors, pillars, and girders supporting them, and the window sashes, are all of iron. Built about 1814.

8. MODEL (on a $\frac{1}{4}$ -inch scale) of the entrance gateway to Keyham Dockyard, in three parts, *a*, *b*, and *c*. (*b*) and (*c*) are moveable, (*b*) representing the gateway as originally designed can be removed and replaced by (*a*), which shows the gateway as actually built. Designed by Mr. Scamp. 1854.

9. MODEL (on a $\frac{1}{4}$ -inch scale) of the head of a jetty, with a steamer alongside, being part of a plan proposed for

coaling ships with great rapidity at Clarence Victualling Yard by means of hydraulic power.

Proposed by Captain James, R.E. 1850.

10. MODEL of the wall round the part of Portsmouth Dockyard added by the extension scheme approved in 1866, showing a proposal for overhanging watch towers to enable the officer or person on guard to look along the outside of the wall.

11. MODEL (on $\frac{1}{6}$ -inch scale) of Sheerness Dockyard. The foundation for a large portion of this yard is made by piling, as shown in the model, nearly 1,000,000 piles being driven in the construction of the works. The dockyard was commenced in the latter part of the year 1813, the first pile being driven on the 23rd December 1813.

The works were completed and opened for the public service on 23rd September 1823.

The engineering works cost 1,616,757*l*. They were designed by Mr. George Rennie and executed under his directions.

The architectural works cost 969,326*l*. These were designed by Mr. Hole, Civil Architect to the Admiralty, and executed under his directions. The total cost of the works was 2,586,083*l*.

This is the original working model by which the works were actually constructed; but additions have been made to it since, so that it correctly represents the changes which have been made up to the year 1840. The water front only is exhibited for want of space. The remainder is carefully preserved in store.

CLASS XII.—DIVISION B.

DRY DOCKS, BASINS, BUILDING SHEDS, TIMBER SHEDS, &c.

(For Floating Docks, see Class XI.)

31. MODELS, three in number (*a*, *b*, and *c*), of zinc roofing.

- (*a*.) Sheet zinc roofing with rolls.
- (*b*.) Steinkeller's patent diamond zinc slates.
- (*c*.) Steinkeller's patent square zinc slates.

Proposed by Mr. William Laird of Liverpool.

32. MODEL (on a $\frac{1}{8}$ -inch scale) of the truss of the roof over No. 4 dock, Devonport Yard, showing the framing. 1830.

33. Section (on a $\frac{1}{8}$ -inch scale) of roof over No. 2 slip, Devonport Yard, showing the framing, &c.
Proposed by Sir Robert Seppings, 1830.

34. MODEL (on a $\frac{1}{40}$ -inch scale) showing the position finally decided on for the proposed new dock in French Creek, Malta. 1865. (This model will be found at Appendix, Class XII., Division A., No. 5, page 98.)

35. Section (on a $\frac{1}{4}$ -in. scale) of the entrance to the old dock at Malta with caisson, showing a peculiar cavern discovered in the rock during the construction of the dock about the year 1844.

36. Working MODEL (on a $\frac{1}{2}$ -in. scale) of a dock gate, showing the arrangement of the metal racers, rollers, heel post, &c., as ordinarily constructed. 1820.

37. MODEL (on a $\frac{1}{8}$ -in. scale) of a dock, showing the altars, timber slides, steps, gates, &c. 1830.

38. MODEL (on a $\frac{1}{4}$ -in. scale) of the basin entrance at Devonport Dockyard, showing the dip of the slate rock upon which it is built, the depth of the foundations, the depth of water, &c. 1854.

39. A MODEL (on a $\frac{1}{4}$ -in. scale) of the part of Devonport Dockyard described in No. 38, but showing a larger portion of the structure. 1854.

40*. MODEL (on a $\frac{1}{2}$ -in. scale) of the original design for the sliding caisson for the new dock in French Creek, Malta, showing the method of lowering the deck so as to enable the caisson to pass in and out of the Camber, and also the proposed machinery for moving the caisson in and out of the Camber. The arrangement actually adopted was, however, slightly different. (See Appendix, Model No. 41*, Class XII., Div. B., p. 100.) 1867.

41*. MODEL (on a $\frac{1}{2}$ -in. scale) of the sliding caisson for the new dock in French Creek, Malta, showing the arrangements for lowering the deck and moving the caisson in and out of the Camber, as they were actually carried out, the difference between this model and model No. 40*, Class XII., Div. B., p. 100, Appendix, being that in No. 40* the caisson is moved by means of a pitch chain, and in this model by means of a rack and pinion. 1868.

42*. MODEL (on a $\frac{1}{2}$ -in. scale) of a swing bridge. 1842.

43*. MODEL (on a $\frac{1}{16}$ -in. scale) of an iron graving dock proposed for Bermuda by Mr. Remington, C.E. 1859.

44*. MODEL (on a $\frac{1}{10}$ -in. scale) of a plan for placing a ship in dock without first fixing the blocks on which she is to rest, should the depth of water be insufficient. The intention was, when it was required to place the blocks, to pump in sufficient water to raise the ship far enough for the blocks to be drawn under, and then to pump the water out again. 1840.

45*. MODELS, two in number (*a* and *b*), of a proposed new dock for Malta yard, to contain ships of the "HERCULES" or "PENELOPE" classes.

(*a*.) General MODEL of the dock, showing the invert, altars, timber slides, steps, and also the sliding caisson for the entrance, and a section of the "HERCULES" placed in it at a mean draught of 30 ft. 6 in.

(*b*.) Half section, to show another proposal as regards the invert, timber slides, &c. for this dock; also a proposed travelling crane along the side of the dock.

Proposed by Mr. Sturdee, master shipwright at Malta. 1866.

46*. MODEL (on a $\frac{1}{4}$ -inch scale) of part of a proposed roof over a slip showing the hipped end at the head of the slip of a rounded form. 1840.

47*. MODEL (on a $\frac{1}{8}$ -inch scale) of the roof over one of the docks at Portsmouth Dockyard. 1830.

48*. MODEL (on a $\frac{1}{4}$ -inch scale) illustrative of a plan for lengthening a dock by adding an additional keel and stems to one side of the caisson, so that the whole of the caisson may be kept without the grooves.

Proposed by Mr. Scamp. 1850.

49*. MODEL of a plan for a sliding iron bridge working on rollers. The part marked A is to be raised by eccentric wheels at the side, worked by a windlass, and then to be drawn back to admit of vessels passing in and out.

Proposed by Mr. Turner, of Dublin. 1865.

CLASS XII.—DIVISION C.

N.B.—There have been no models added to this Division since the Catalogue was published.

CLASS XII.—DIVISION D.

BREAKWATERS, &c.

63. General MODEL (on a $\frac{1}{300}$ -inch scale) in polished Devonshire marble of Plymouth breakwater.

This magnificent breakwater has been thrown across the entrance of Plymouth Sound for the protection of the anchorage. It was projected in 1806, actually commenced on 12th August 1812. It made its first appearance above the surface of the Sound at low-water mark, spring tide on 31st March 1813, and was completed about the year 1856. It was designed by Messrs. Rennie, Whidbey, and Hemans. Its western extremity is placed about 210 fathoms to the northward of the shoal of the Panther, and extending towards Bovisand Bay directly across the shoal of the Shovel, terminates in the vicinity of Staddon Point, from which it is distant 360 fathoms. The central division of this breakwater makes an angle with the true meridian of N. 86° W., and is in length 3,000 feet, from each end of which an arm or head projects to the distance of 1,050 feet more, so as to shut in that part of the Sound which lies to the south-eastward of a straight line drawn from Penlee to Dunstone Points.

It is composed of large blocks of limestone or gray marble taken from a quarry at Oreston, on the eastern shore of Catwater, consisting of a surface of 25 acres, which was purchased from the Duke of Bedford for the sum of 10,000*l*. The blocks varied in weight from one to five tons.

On the 19th January 1817 Plymouth Sound was visited by a tremendous gale, of such magnitude that it was the general opinion that but for the breakwater the whole of the ships inside must have been wrecked, and the Victualling Yard and most of the buildings on the margin of the sea swept away. The breakwater, however, prevented any damage to either, but did not escape without injury itself. About 200 yards in length and 30 yards in width of the upper stratum were displaced, and the whole of the huge stones, from two to five tons in weight each, carried over and deposited on the northern slope of the breakwater.

After that a considerable portion of the sea front was cased with masonry of immense masses of stone, but smoothly and beautifully laid; and the better to protect this the foot of the slope was extended seaward, in order to protect the foot of the masonry, by throwing in a great quantity of large and rubble stones.

A lighthouse was completed on the western end of the breakwater in 1844. The total cost of the breakwater was about 1,562,000*l*. (See Catalogue Class XII., Division D, No. 63, page 247.)

64. MODEL of a section of an iron wave-screen, proposed for Deal Sand, to shelter the small Downs, the object being to stop the wave at the surface without obstructing too much of the current, and destroying the scour over the bottom. Proposed July 1844.

CLASS XII.—DIVISION E.

N.B.—There have been no models added to this Division since the Catalogue was published.

CLASS XIII.

Plans and Compositions for the Preservation of Ships' Bottoms, Iron Work, &c. from the Effect of Time and Sea Water; also Specimens showing Damage done by the same.

Divisions.

- | | |
|--|---|
| <p>A.—Specimens of composition, &c. for preserving timber, iron, copper, &c.</p> <p>B.—Plans for preserving ships' bottoms, iron work, &c., by coppering, galvanizing, &c.</p> <p>C.—Specimens of the formation of fungus, barnacles, mussel shells, coral, weed, &c. on the bottoms of ships.</p> | <p>D.—Specimens of copper and iron bolts, sheathing, &c., after having been for some time in use.</p> <p>E.—Specimens of the effect on timber, &c., of the <i>teredo navalis</i>, white ant, dry rot, &c.</p> <p>F.—Relics of the "ROYAL GEORGE," sunk at Spithead in 1782, recovered in 1839 by Col. Pasley.</p> |
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CLASS XIII.—DIVISION A.

SPECIMENS OF COMPOSITION, &c. FOR PRESERVING TIMBER, IRON, COPPER, &c.

27. Specimen of a composition for preventing the bottoms of iron ships from getting foul.

Proposed by Messrs. McMillan & Co. 1865.

28. Three specimens of "pure carbon paint," for covering all external surfaces exposed to water or atmospheric influences.

Received from Mr. J. Walker. 1865.

29. Specimen of a composition for preventing oxidation and fouling on the bottom of iron ships; stated to be of such a nature that nothing in the sea or on land will adhere to it.

Proposed by Mr. John Chester. 1866.

30. Specimens (two in number, *a* and *b*) of Westwood and Baillie's patent composition for coating iron ships, so as to prevent oxidation, and to enable them to be coppered. It was also proposed for coating the sides of iron-clad ships of war between the wood backing and the skin plating of the ship's side, to protect the iron from corrosion, and form a solid foundation for the wood backing, as the patent composition adheres to both iron and timber. It was likewise intended to assist the fastenings of the wood backing, and render them perfectly watertight. The specimens show the composition applied both to wood and iron.

Proposed by Messrs. Westwood and Baillie, 1867, in connexion with a plan of theirs for sheathing iron ships with wood.

31. Specimens (two in number, *a* and *b*) of compositions to preserve iron, wood, ropes, &c. They are said not to contain any pitch or tar, but are intended to resist the action of water, rust, or foul air.

Proposed by Mr. Joseph Fenton. 1866.

32. Specimen of iron coated with a soluble silicate, and then with red lead paint, and afterwards immersed in sea water for about two months, from the end of February to the beginning of April 1865. This method of treatment was proposed by the Chemical Department, Portsmouth Dockyard.

33. Specimens of iron plates coated with Hay's waterproof glue and Portland cement, to test various plans for the purpose of protecting the under side of iron decks from corrosion.

(*a.*) Hay's waterproof glue put on alone.

(*b.*) Mixture of Hay's waterproof glue and Portland cement, put on with a trowel—one coat.

(*c.*) Mixture of Hay's waterproof glue and Portland cement, put on with a brush—two coats.

These specimens were prepared at Portsmouth Dockyard. 1866.

34. Specimen of a composition to prevent corrosion, taken from the bottom of the "FRIEDERICH KARL," Prussian ship, built of iron. Taken off at Devonport. 1868.

35. Specimen of Mr. Bielefield's patent fibrous slab, proposed by Captain R. Scott, R.N., as a substitute for wood for lining the insides of iron ships; he considered that being impervious to damp it would protect the iron from corrosion. 1865. (The specimen will be found at Class XVII., No. 26, page 114, Appendix.)

36. Specimens (six in number, *a, b, c, d, e, f*) of various substances coated with Colonel S. Zerelmy's composition, showing the extent to which it preserved them from corrosion or decay under the different treatments stated against them to which they were afterwards subjected.

- (*a*) Plate of ship iron.
- (*b*) Piece of sheet iron which was immersed in the sea from 21 August 1852 to September 1856.
- (*c*) Piece of common deal which was immersed in the sea from 21 August 1852 to September 1862.
- (*d*) A piece of timber which was immersed in the sea for some considerable time.
- (*e*) A railway sleeper which was buried from 1852 to 1862.
- (*f*) A piece of timber which was buried in India from 1856 to 1860 in ground infested with white ants.

CLASS XIII.—DIVISION B.

PLANS FOR PRESERVING SHIPS' BOTTOMS, IRONWORK, &c., BY COPPERING, GALVA- NIZING, &c.

68. Two MODELS, showing plans for applying zinc directly to the bottoms of iron ships to preserve them from corrosion; applicable to ships already built, as well as to vessels built expressly with a view to being sheathed.

Proposed by Mr. Hay, of Portsmouth Dockyard. 1866.

69. Five MODELS of Mulley's improved method of metal sheathing iron ships.

The metal sheathing is applied by interposing a wooden skin, which is first trimmed and fitted close to the bottom of the ship, then morticed for the holdfasts, bedded in a suitable composition, and secured by the introduction of screws or rivets from the front. The rivets are put in hot

in the usual way, passed through an iron tube to avoid burning the wood. The hollow part of the holdfast is filled in with wood at the plank edges, and with cement. The iron holdfasts, spaced about 4 feet apart, are meant to act as dowels, and grasp at once the entire breadth of plank, and thus effect a cohesion of all the parts, the fastening screws or rivets being at the same time protected by intervening wood or cement. Red pine or hackmatack is proposed for the sheathing under the metal, which is intended to be carried up to the load water-line, the two or three strakes above that height to be of teak.

Proposed by Mr. W. R. Mulley. 1866.

70. Plan for coppering iron ships, adopted in some of the French men of war. The specimen has been immersed in the sea for 15 months. The copper is applied in the following manner:—First the iron is covered with a minimis paint, then with one or more coats of mastic, intended to serve as an insulator; over this is placed a thin covering of sheet lead, and on this again is placed the copper sheathing. The whole is fastened to the iron bottom by copper rivets driven into holes which are drilled about half through the iron, and are countersunk on the inside.

Proposed by Monsieur Le Capitaine de Roux. 1866.

71. MODEL of a plan for sheathing iron ships with zinc.
Portsmouth Yard. 1867.

72. Specimen of a bolt or rivet proposed to be used in securing wood sheathing to iron ships, with a view to enabling them to be coppered. The plan is as follows:—The rivets to be manufactured with a hole in their head to receive the bolt; they could be tapped either before or after the rivet is in place. The advantages of having the hole made at the same time as the bolt would be that a saving of both labour and material would be effected, and it would insure the hole being in the centre of the rivet head, and also its being square to the ship's side. This plan might be adopted for ships already built.

Proposed by Mr. R. Barnaby and Mr. J. Dealler.
1866.

73. MODEL to illustrate Commander Warren's plan of sheathing iron ships with copper, or other metal sheathing. His plan is as follows: The parts of the vessel to be sheathed are first covered with a coating of fibrous material attached to the vessel by means of Hay's waterproof glue or other suitable adhesive composition. The coating of fibrous material is intended to be further secured to the vessel by a

band of wood secured by screws. One side of the Muntz's metal or other sheathing is also to be covered with a coating of fibrous material attached to it by the waterproof glue or other composition. The sheathing is then made to adhere to the surface prepared for it by another application of glue or composition, and further secured by split pins or rivets of copper passing through it, and formed with curved or angular points, so that, on being passed through the sheathing and material attached thereto and driven home, they shall, on coming into contact with the inner layer of fibrous material, be opened out or clenched so as firmly to secure the sheathing to the ship's side.

Proposed by Commander F. P. Warren, R.N. 1863.

74. Specimens of zinc rivet nails so annealed (although of zinc) as to bend as readily as copper, for attaching metal sheathing to iron ships, on Commander Warren's plan. (See preceding Model, No. 73.)

Proposed by Commander F. Warren, R.N. 1866.

75. MODEL, illustrative of a plan for constructing iron ships and sheathing them with copper. The ships are constructed with plates of iron of the usual thickness and size, and upon the principle of what is termed butt or flush joints horizontally as well as vertically, having strips or bands on the inside of the plates, and with a double row of rivets or two double rows of rivets, as is usual with flush joints; but the edges of the plates are not allowed to touch each other, but are kept about half an inch apart for the purpose of being caulked, or filled in between and around the plates with strips of hard india rubber or teak, into which holes are bored if necessary, in order to fix on metal sheathing with suitable short nails. The butt joint is thus really converted into two capjoints; sheets of insulating material being also interposed between the metal sheathing and the ship's side.

Proposed by Mr. T. B. Daft. 1863.

76. Six specimens showing a proposal for attaching copper to the bottoms of iron ships by means of hot pitch. Glass, canvass, wire, or gauze, &c., are proposed to be placed between the copper and iron, partly to act as insulators and partly to increase the power of adhesion.

Proposed by Mr. John White, of Finchley. 1867.

77. Plan for preserving the bottoms of iron ships by sheathing them with zinc.

Proposed by Messrs. Dudgeon. 1867.

CLASS XIII.—DIVISION C.

SPECIMENS OF THE FORMATION OF FUNGUS,
BARNACLES, MUSSEL SHELLS, CORAL, WEED,
&c. ON THE BOTTOMS OF SHIPS.

106. Two specimens (*a* and *b*) to show that barnacles, &c. will adhere to glazed surfaces, and that therefore vitreous sheathing will not prevent ships from fouling.

(*a*.) Piece of glazed earthenware laid down in the river Exe, below low-water mark, on 15th October 1865, and taken up on 15th February 1866, after four months' immersion.

(*b*.) Piece of glass bottle laid down in the river Exe, below low-water mark, on 15th October 1865, and taken up on 15th February 1866, after four months' immersion.

By Mr. George Peacock, Assoc. I.N.A. 1866.

107. Specimens of shells taken off the bottom of H.M.S. "BLOODHOUND" at the Cape of Good Hope, June 1863.

CLASS XIII.—DIVISION D.

SPECIMENS OF COPPER AND IRON BOLTS,
SHEATHING, &c. AFTER HAVING BEEN FOR
SOME TIME IN USE.

131. Specimens of decayed Fearnought grummetts, removed from under the nuts of the bolts for holding the teak backing in place behind the armour plates in H.M.S. "ACHILLES," after they had been in use about 18 months.

Received from Devonport Dockyard, January 1865.

132. Two sheets of Betteley's metal sheathing taken from the bottom of the "CALEDONIA" after being $2\frac{1}{2}$ years on the ship; also two screw bolts (marked A.) taken from the wood sheathing behind Betteley's sheathing, and two other screw bolts (marked B.) taken from the wood sheathing behind the Muntz's metal.

Taken off at Devonport Dockyard, 1866.

133. Specimens of metal screw bolts used in fastening to the "PALLAS" the wood sheathing which was fitted to prevent galvanic action and corrosion of the armour plates. These were in an exceptionably bad state, most of the bolts being very little injured.

Taken off at Devonport Dockyard, 1867.

134. Specimens of cuttings from the rudder spindle of the "REINDEER." It was found very much honeycombed at the end from bad casting, and with the slightest blow of a hammer the surface was indented considerably, and in several places it could be probed to the depth of three-quarters of an inch.

Condemned, and a new one supplied, 1867.

135. Specimens of metal screw bolts after having been used for about a twelvemonth in fastening to the "ENTERPRISE" the wood sheathing which was fitted to prevent galvanic action and corrosion of the armour plates.

Taken off at Malta Dockyard, January 1866.

CLASS XIII.—DIVISION E.

SPECIMENS OF THE EFFECT ON TIMBER, &c. OF
THE TEREDO NAVALIS, WHITE ANT, DRY
ROT, &c.

189. Decayed pieces of wood taken partly from the step to foremast, partly from the keelson, and partly from the coak to step of foremast of the "BRISTOL." On the mast being lifted at Elephant Bay the step was found thoroughly decayed by "*drux*," the after part crumbled with the least pressure, and a few blows with a maul drove it to pieces very easily. 1867.

190. Specimen of rotten wood taken from the main mast of the "PRINCESS CHARLOTTE" at Hong Kong, found to be in so bad a state as to be unsafe.

Forwarded by Commodore Jones, 29th April 1867.

CLASS XIV.

Tools, Machines, and Machinery.

Divisions.

- A.—Hand Tools.
- B.—Machines for dock-yards.
- C.—Steam engines and boilers.

CLASS XIV.—DIVISION A.

N.B.—There have been no models added to this Division since the Catalogue was published.

CLASS XIV.—DIVISION B.

MACHINES FOR THE DOCKYARDS.

51. MODEL of a furnace for heating and re-heating armour plates for bending. The plate could by this means be heated where required without the whole plate being heated, and thus avoid the necessity of using hydraulic pressure, which at times results in breaking the plate.

Proposed by Mr. G. T. Welch, 1866.

52. MODELS of upper and lower cutters of a shearing machine in use at Pembroke Dockyard for cutting to shape the bracket plates for iron ships, and such like jobs. 1865.

53. A MODEL of a truck for carrying boilers, and other heavy articles, fitted with two sets of wheels set at right angles so that the truck may be moved either forwards, backwards, or sideways without being turned round, by throwing one set of wheels out of gear and the other in.

1860.

54. MODEL of a truck for moving boilers, &c., fitted with two large centre wheels and four small ones, two on either side of the large wheels, the latter being arranged to serve for guiding wheels to regulate the direction in which the truck is to move.

1860.

55. MODEL of a truck with wheels fitted to run on a tramway or railway ; also fitted with rails for the purpose of receiving a waggon or carriage from a tramway of a higher level. 1850.

56. Specimen of a portion of a saw, showing how the teeth can be cut and the saw completely sharpened, without the use of files, by the saw sharpening machine invented by the Plymouth Foundry and Engine Works Company. The cutting or sharpening is effected by a patent emery disc revolving at great speed. 1867.

CLASS XIV.—DIVISION C.

STEAM ENGINES AND BOILERS.

81. MODEL of patent double expansive single-cylinder engine adapted for driving a screw propeller. These engines are designed for working steam very expansively, and are consequently specially adapted for higher pressures than those now commonly in use in steam vessels, 50 lbs. being the pressure intended to be employed in the engines above referred to. The cylinder is made double the ordinary length, or four times the length of the crank, and is divided into two parts by an annular partition, through which partition a trunk works having a piston at each end. Steam from the boiler is admitted alternately into the annular spaces on each side of the partition, and is cut off by the lap of the valve at about $\frac{5}{8}$ ths of the stroke, (or earlier, when required, by link motion,) and after this partial expansion passes into the respective ends of the cylinder, where it is fully expanded to a pressure proportionate to the relative capacities of the cylinder and the annular spaces around the trunk. The intended arrangement of the parts in these engines is shown in the model, but it may be varied as required for engines constructed for special purposes.

Proposed by Mr. Edward Ellis Allen, 40, Parliament Street, Westminster, and lately (May 1867) ordered to be fitted on board H.M. steam sloop "Spartan" 350 (collective) nominal horse power.

82. MODEL of a plan for repairing tubes of steam-boilers at the place where they generally first give way or leak, at or near the connexion with the tube plate or near their mouths. The invention consists of a split ring or gland,

which is first painted over with a mixture of white and red lead, and cast-iron borings, and while still moist the gland is inserted into the defective tube. The new piece of tubing is then inserted within this gland or split ring and driven home. The forced expansion of the ring completely fills up and renders watertight the defective tube, the operation being scarcely more troublesome than driving a nail, and very much less laborious than removing the tube for repair.

Invented by Mr. Edward Clark of New York, 1865.
Under trial.

83. How's patent salinometer. The use of this instrument is to indicate the exact time at which marine steam boilers should be blown off, so as to prevent a wasteful expenditure of hot water and consequently of fuel by blowing off too often, and on the other hand to avoid the risk of the metal of the boilers becoming burnt or a bad conductor of heat by a deposition of salt. On turning the stopcocks connecting the instrument with the boiler, the body of the salinometer becomes filled with a sample of water drawn from the interior of the boiler, which is continuous by means of the overflow pipe, the temperature and saline properties of which are constantly tested, and the necessity or not for blowing off is seen by the engineer by looking at the scale of the hydrometer floating in it, which rises higher in the water in proportion as the water becomes more saturated with saline matter; when the word "blow" is at the surface it shows that at the temperature of 200° Fahrenheit there are 2½ lbs. of salt in every 32 lbs. of water held in solution in the boiler, and that it is necessary to admit fresh water, the neglect of which exposes the boiler to incrustation. The temperature of the water in the salinometer should be kept at 200° Fahrenheit, which may be done by regulating the flow of water from the boiler. 1860.

84. Three specimens of salinometers or hydrometers for testing the saltiness of water in marine boilers, in order to tell when they should be blown off. By Mr. Buss, London. 1860.

85. Specimens (four in number, *a, b, c, d*) of expanding drifts made of steel, being a species of large punches for enlarging holes already made in iron plates.

Proposed by Mr. Boffey, foreman of boiler makers,
Sheerness Yard. 1861.

86. Specimen (full size) of a sluice valve of a simple form. 1867.

87. Specimen of Joublin's chains used in the French Navy for removing the incrustation which accumulates on the outside of boiler tubes. The mode of using them is to pass them round the tube and draw them backwards and forwards till the deposit is removed.

Proposed by Lieut. Denayrouze, of the French Navy.
1867.

88. Two MODELS (*a* and *b*) of the interior of marine boilers. (*a*), which is a model of the boiler of the steamer "DIAMOND," represents the ordinary tubular boiler, with the fire-box, funnel, tubes, &c. (*b*) represents a modification of the ordinary boiler, six additional fire-boxes being introduced for the purpose apparently of breaking up the flame, and thus preventing the heat from escaping too rapidly up the funnel. Neither the name of the inventor, nor any further particulars concerning it are known.

89. Specimen of a blow-off cock (full size). This cock is placed in the bottom of a vessel, with a pipe leading to the bottom of the boiler, and is used for getting rid of the sediment which accumulates on the bottom of the boiler. When the cock is opened the pressure of the steam in the boiler forces the sediment through the pipe into the sea.

1866.

90. Pattern of improved patent furnace bar for marine boilers. These bars are so constructed that they can be tilted by means of an eccentric so as to get rid of the ashes and prevent the accumulation of clinker on them.

Proposed by Mr. W. A. Martin, 1867.

CLASS XV.

Figure-heads, Busts, Carvings, &c.

N.B.—There have been no models added to this Class since the Catalogue was published.

CLASS XVI.

Drawings, Paintings, &c.

N.B.—There have been no models added to this Class since the Catalogue was published.

CLASS XVII.

Miscellaneous, to include all that cannot be classed under any of the foregoing heads.

22. Four specimens of a cork material for the construction of boats, buoys, pontoons, powder cases, &c., and for lining the insides of iron ships between decks.

Proposed by Mr. T. C. Clarkson. 1865.

23. Specimen of a copper bolt with a wire passing through it, which was intended to be used as a Government mark, but was not adopted as it caused the bolts to break in driving, as shown by this piece. 1865.

24. MODEL of a plan for clearing the anchorages in the Baltic of infernal machines, proposed during the Crimean war, 1855. Two steamers are to be fitted with spars (the ordinary spars in each ship are available for the purpose) projecting over the bows, the lower part being immediately below the keel and extending on each side beyond the width of the steamer at the paddle boxes; the steamers to be kept about half a cable apart, abreast of each other, with a strong hawser from the bows of each, and another hawser as a sweep between the ships. On the hight of each, iron creepers are attached, to drag on or near the bottom, so as to hook any infernal machines that may be lying on the space between the steamers.

Proposed by Rear-Admiral Sir William H. Hall, K.C.B., F.R.S. 1855.

25. MODEL of the scaffolding used in building the Nelson Column, in Trafalgar Square.

26. Specimen of Mr. Bielefield's patent fibrous slab, proposed by Captain R. Scott, R.N., as a substitute for wood for lining the insides of iron ships; he considered that it would be more lasting, that being waterproof it would protect the iron from corrosion, and in the event of a shot passing through that it would not splinter. Captain Scott was also of opinion that if the outsides of armour plates were covered with it, it would considerably increase their resistance to shot. 1862.

PART II.

COLLECTION OF PAINTINGS & MODELS FROM PRIVATE SOURCES.

PAINTINGS, DRAWINGS, &c.

44. A drawing of the port disposition of the frame of H.M.S. "AMETHYST," wrecked in Bovesand Bay, Plymouth Sound, in 1811. Her top side timbers had been continuously bolted, when last repaired according to the plan proposed by the late "Joseph Tucker," Esq., surveyor of the Navy, and after having been 21 days on the rocks during a gale of wind, she was floated off to Plymouth Dockyard, with unbroken sheer.

Presented by Mr. John Scott Tucker.

45. Drawing of a proposed 4-decked ship, the "DUKE OF KENT" 170 guns, planned and proposed by the late "Joseph Tucker" Esq., surveyor of the Navy. 1813-1831.

Presented by Mr. John Scott Tucker.

46. Engraving of "Lumley's" rudder, showing its modifications.

Lent by Mr. H. Lumley, Assoc. I.N.A.

47. Coloured engraving of Capt. E. Bedford's, R.N., uniform code for the distinction of buoys by colour.

Presented by Capt. E. G. Bedford, R.N.

48. Painting in oil. A launch at Deptford dockyard. English, middle of the 18th centy.

By J. Cleveley.

49 to 63. The following drawings, &c., have been lent by Mr. John Scott Russell, F.R.S., and are all of ships built by him.

49. Longitudinal drawing of the "GREAT EASTERN" steamship.

50. Drawing of the cross section of the "GREAT EASTERN" steamship.

51. Water colour drawing of the "GREAT EASTERN" steamship, off the Isle of Wight.

52. Oil painting of the "GREAT EASTERN" steamship going through the Downs.

53. Oil painting of the "GREAT EASTERN" steamship, leaving the river Medway, off Sheerness.

54. Oil painting of the Royal West India Mail Company's fleet in Southampton Water.

55. Water colour drawing of the Sydney and Melbourne Royal Mail Steam Packet Company's paddle steamer "PACIFIC," tons 1,470, horse power 500.

56. Drawings of the engines of the Sydney and Melbourne Royal Mail Steam Packet Company's steamer "PACIFIC."

57. Water colour drawing of the Prussian man-of-war paddle steamer, "DANTZIG." Guns 12. Horse power 400, and Prussian frigates.

58. Water colour drawing of the Prussian paddle gun-boats "NIX" and "SALAMANDER."

59. Water colour drawing of "DANTZIG," "NIX," and "SALAMANDER" at gunnery practice.

60. Water colour drawing of a four masted screw steamer.

61. Water colour drawing of a four masted sailing ship in a gale of wind.

62. Water colour drawing of a screw steamer.

63. Water colour drawing of the launch of a frigate at Millwall.

64. Two engravings showing elevation, longitudinal section, &c., of improved life boat, arranged to pack one in the other.

Presented by Mr. George Fawcens, North Shields.

65. The American packet ship "WARREN" under jury masts and temporary rudder. These were fitted after her own had been carried away by a storm in the Mid-Atlantic, and enabled her to reach England in safety.

Painted by Mr. George Mears.

66. Oil painting of a Dutch man-of-war. By A. Stork.

Lent by Mr. T. Dyer Edwardes.

67. Oil painting of an action between Maltese and Algerine vessels. By Vanvitelli, 1647—1736.

Lent by Mr. T. Dyer Edwardes.

68. Oil painting of Maltese men-of-war at anchor. By Vanvitelli, 1647—1736. Lent by Mr. T. Dyer Edwardes.

69. Picture of Dutch men-of-war. By Johannes Coesermans. Lent by Mr. T. Dyer Edwardes.

- 70.** Oil painting of Dutch shipping. By Van Ass.
Lent by Mr. T. Dyer Edwardes.
- 71.** Twenty-three engravings of shipping, &c., of different periods.
Presented by Mr. T. Dyer Edwardes.
- 72.** Photograph of the fore topsail of Lord Nelson's ship "VICTORY," after the battle of Trafalgar in 1805.
Presented by Mr. S. Willcocks, Master Sailmaker,
H.M. Dockyard, Sheerness.

MODELS.

164.* HALF MODEL of Messrs. Westwood and Baillie's design for an armour-plated turret ship, showing broadside, fore and aft angular firing. Tons 6,300. Guns 22. Horse power 1,160. Lent by Messrs. Westwood and Baillie.

165. MODEL of section of a vessel with masts and sails on the flat surface principle.

Presented by Lieut. W. Congalton, R.N.R.

166. MODEL of the Montreal Ocean Steamship Company's screw steamers "HIBERNIA" and "NORWEGIAN." Tons 2,041. Nominal horse power 400. Designed and built by W. Denny, Brothers, Dumbarton.

This MODEL shows on the port side the internal arrangements of cabins, engine-room, &c.

Lent by Messrs. W. Denny, Brothers, Dumbarton, N.B.

167. HALF MODEL of Messrs. Jardine, Mathison, and Co's paddle steamer "GLENGYLE," constructed for the navigation of the river Yangtze. Tons 2,040, nominal horse power 400. Designed and built by W. Denny, Brothers, Dumbarton.

Presented by W. Denny, Brothers, Dumbarton, N.B.

168. "Fawcus's" improved blocks for lowering ship's boats, with necessary fittings for boat's side, thwarts, &c.

Presented by Mr. George Fawcus, North Shields.

169. Three MODELS showing various systems of "Lumley's" patent rudder.

Invented by H. Lumley, Assoc. I.N.A. See No. 36, p. 197.

170. Yoke and crutches, made from a brass gun taken in Sebastopol, 8th September, 1855. Presented to the late Capt. Crispin, R.N. Lent by Mrs. Crispin.

171. HALF MODEL of the iron sailing ship, "VICTORY. Tons 1,198. Built 1863. Designed and built by Messrs. Laurence Hill and Co.

Presented by Messrs. Laurence Hill and Co., Glasgow.

172. MODEL of a patent topmast, designed by Captain Turnbull.

Presented by Messrs. Laurence Hill, and Co. Glasgow.

173. MODEL of a ship's bulwarks fitted with "Fawcus's" patent revolving head davits, for lowering and stowing boats promptly.

Lent by Mr. George Fawcus, North Shields.

174. Two MODELS showing arrangements of boat-chocks with sliding wedge pieces, on Mr. Fawcus's plan.

Lent by Mr. George Fawcus, North Shields.

175. MODEL of the Eddystone Lighthouse, made by George Knott, for many years lightkeeper on the rock.

Lent by the Corporation of the Trinity House.

176. MODEL of the Light Ship stationed on the Goodwin Sands, with lanterns, and all fitments complete for day and night service. Tons 195.

Lent by the Corporation of the Trinity House.

177. MODEL of the first iron steamers built on the Thames, the "LORD W. BENTINCK," "MAGNA," and "JUMNA," in 1832, for the Honourable East India Company, for the navigation of the river Ganges.

Designed and built by Messrs. Maudslay, Sons, and Field.

Presented by Messrs. Maudslay, Sons, and Field.

178. MODEL of the stern of a ship fitted with J. Scott Tucker's proposed balance rudder, which can only be unshipped when at right angles with the keel.

Presented by Mr. J. S. Tucker.

179. Two MODELS showing "Fawcus's" new mode of constructing boats, so that several of the same size and shape may be packed together indiscriminately.

Lent by Mr. G. Fawcus, North Shields.

180. MODEL of a double rudder fitted to stern of a screw steamer. Proposed by Lieut. the Hon. J. Fitzmaurice, R.N.

Lent by Lieut. the Hon. J. Fitzmaurice, R.N.

181. The original mast-head swivel actually used on Mr. Dempster's yacht "PROBLEM." Exhibited with the model of the yacht in Admiralty collection, No. 364, class 1, division B.

Lent by Mr. H. Dempster, H.E.I.C.S

182. MODEL of the screw steamer "CITY OF PARIS," belonging to the Liverpool, New York, and Philadelphia Steam Shipping Company (*Inman Line*); tons 2,740, nominal horse power 550. Launched December 1865.

Presented by the Inman Company, Liverpool.

183. MODEL of "Blake's" method for ventilating troop ships.

Presented by the Rev. J. Hardie.

184. MODEL of "Blake's" single hook for futtock shrouds.

Presented by the Rev. J. Hardie.

185. MODEL of "Blake's" plan for adding power to the rudders of gunboats, and vessels of light draught.

Presented by the Rev. J. Hardie.

186. Two MODELS of "Blake's" patent fids, and plans for fidding topmasts.

Presented by the Rev. J. Hardie.

187. MODEL of "Blake's" stoppers and fid for shortening the bowsprit.

Presented by the Rev. J. Hardie.

188. MODEL of "Blake's" tumbler hook for letting go the sheet of a boat in cases of emergency.

Presented by the Rev. J. Hardie.

189. MODEL of two half sterns of a first-rate ship showing "Blake's" method for the framing of the timber, &c., and gallery.

Presented by the Rev. J. Hardie.

190. MODEL of "Blake's" plan for the prevention of water entering a ship, in the event of any accident to the screw.

Presented by the Rev. J. Hardie.

191. Two MODELS, one iron and one wood, for steps of lower masts, on "Blake's" plan.

Presented by the Rev. J. Hardie.

192. MODEL showing "Blake's" stoppers for letting go anchors.

Presented by the Rev. J. Hardie.

193. MODEL of "Blake's" plan for barring in the ports, and showing method of ventilation.

Presented by the Rev. J. Hardie.

194. MODEL of "Blake's" plan showing alteration in method of securing shrouds, and doing away with lower deadeyes.

Presented by the Rev. J. Hardie.

195. "Blake's" proposed deadeyes for all ships.

Presented by the Rev. J. Hardie.

196. Five plans (on "Blake's" principle) for toggles.

Presented by the Rev. J. Hardie.

- 197.** Screw eye bolt (on "Blake's" plan).
Presented by the Rev. J. Hardie.
- 198.** MODEL of "Blake's" plan for connecting beams to ship's side.
Presented by the Rev. J. Hardie.
- 199.** "Blake's" improved stopper bolt.
Presented by the Rev. J. Hardie.
- 200.** MODEL of "Blake's" plan for constructing a temporary rudder.
Presented by the Rev. J. Hardie.
- 201.** MODEL of "Blake's" slip hook for mooring chains.
Presented by the Rev. J. Hardie.
- 202.** MODEL on "Blake's" plan of futtock timbers, fitted with side chock.
Presented by the Rev. J. Hardie.
- 203.** MODEL on "Blake's" plan of futtock timber with side scarf.
Presented by the Rev. J. Hardie.
- 204.** MODEL on "Blake's" plan of futtock to dispense with angle chock.
Presented by the Rev. J. Hardie.
- 205.** MODEL on "Blake's" plan of two floors, made good with chocks at the side of keel.
- 206.** MODEL of floor and first buttock, united together on the old plan.
Presented by the Rev. J. Hardie.
- 207.** MODEL of common floor timber, chocked at the heel on the side of keel.
Presented by the Rev. J. Hardie.
- 208.** MODEL, on "Blake's" plan, of two bent floor timbers, with saw-kerf in middle of moulding side, to assist the bending.
Presented by the Rev. J. Hardie.
- 209.** SPECIMEN of zinc sheathing for iron vessels ("Daft's" patent). Patented September 1863.
[In place of Specimen, No. 151, Part 2.]
Presented by Mr. T. B. Daft, C.E.
- 210.** Specimens of fishing nets used in the French fisheries.
Presented by Mr. C. W. Merrifield, F.R.S.
- 211.** MODEL of Cunningham's self-reefing topsail, or plan for reefing from the deck. Invented by Henry D. P. Cunningham, 1850. Lent by Mr. H. D. P. Cunningham.
- 212.** MODEL of the iron sailing ship "DURHAM," tons 998. Designed and built by Messrs. Oswald & Co.
Lent by Messrs. Oswald & Co., Sunderland.
- 213.** MODEL of an iron screw steamer, built and designed by Messrs. Oswald & Co. for the Baltic or Mediterranean trade, tons 550, nominal horse power 100.
Lent by Messrs. Oswald & Co., Sunderland.

214. MODEL of the iron screw steamer "MEDWAY," tons 1,464, nominal horse power 250. Designed and built by Messrs. Oswald & Co.

This steamer was employed, in conjunction with the "GREAT EASTERN" steamship, in laying the Atlantic telegraph cable, 1866.

Lent by Messrs. Oswald & Co., Sunderland.

215—222. Series of MODELS, presented by R. Napier and Sons, illustrating a system of Plans for combined turret and broadside navies, by Vice-Admiral Edward Pellew Halsted, designed by C. F. Henwood, Esq., naval architect, on the turret and tripod *mast* system of Captain Cowper P. Coles, R.N., C.B.

The armament adopted for these ships of war is wholly on the system for rifled ordnance of Joseph Whitworth, Esq., F.R.S., and mounted on the muzzle-pivoting gun-carriages of Captain Heathorn, R.A.

A. Whole MODEL, full rigged, of "DREADNOUGHT," 1st rate.

Turrets	-	-	-	7
Number of guns in turrets	-	-	-	14, of 9-in. calibre.
"	broadside guns	-	-	4, of 7-in. "
"	"	"	"	10, of 4-in. "
Tons	-	"	-	10,764, builders' measurement.
Nominal horse power	-	-	-	1,300

B. Whole MODEL, full rigged, of corvette "ACTIVE," 6th rate.

Turrets	-	-	-	2
Number of guns in turrets	-	-	-	4, of 9-in. calibre.
"	broadside guns	-	-	10, of 7-in. "
Tons	-	-	-	4,926, builders' measurement.
Nominal horse power	-	-	-	1,000

C. Whole MODEL of ocean despatch vessel "VEDETTE," 8th rate.

Turrets	-	-	-	1
Number of guns in turret	-	-	-	2, of 9-in. calibre.
"	broadside guns	-	-	10, of 5½-in. "
Tons	-	-	-	3,684, builders' measurement.
Nominal horse power	-	-	-	800

216. Series of half-block MODELS, from 1st to 5th rate, showing the proposed internal fittings and arrangements of Vice-Admiral Halsted's turret ships.

217. MODEL of midship section of turret ships, proposed by Vice-Admiral Halsted.

218. MODEL, showing portion of main deck battery, of Vice-Admiral Halsted's combined turret and broadside ships.

219. MODEL of R. Napier's patent 2-gun turret, designed for Vice-Admiral Halsted's proposed system.

220. MODEL for illustrating the bow-line of fire, on Vice-Admiral Halsted's system of turret ships.

221. Four MODELS of steel screw boats, designed by Vice-Admiral Halsted for his combined turret and broadside ships.

1. *Launch.*

Length	-	-	-	50 feet.
Guns	-	-	-	2 ten-pounders.
Oars	-	-	-	22

2. *Pinnace.*

Length	-	-	-	45 feet.
Guns	-	-	-	2 ten-pounders.
Oars	-	-	-	20

3. *First Cutter.*

Length	-	-	-	35 feet.
Guns	-	-	-	2 two-pounders.
Oars	-	-	-	14

4. *Second Cutter.*

Length	-	-	-	30 feet.
Guns	-	-	-	2 two-pounders.
Oars	-	-	-	12

The engines for these boats specially designed by J. Penn; Esq., F.R.S.

222. SECTION, full size, showing portion of strake and gunwale of steel boats, with metal crutch.

Designed by Vice-Admiral Halsted.

223. MODEL of a steering wheel, known as the "Niagara" wheel.

Lent by Mr. Andrew Murray, chief engineer H.M. Dockyard, Portsmouth.

224. Series of PROJECTILES, contributed by the Whitworth Armoury Company (Limited), Manchester, showing calibres from a 2-pr. to a 9-in. or 320-pr. rifled gun.

Proposed for Vice-Admiral Halsted's system of turret and broadside ships of war.

225. MODEL of Berthon's patent collapsible troop boats

Length	-	-	-	30 feet.
Beam	-	-	-	14 feet.
Depth	-	-	-	6 feet 3 inches.
Oars	-	-	-	12
Troops	-	-	-	200

Lent by the Rev. E. L. Berthon, Romsey, Hants.

226. Berthon's patent Nantachometer or perpetual log, for indicating speed of ships.

Lent by the Rev. E. L. Berthon, Romsey, Hants.

227. Berthon's patent bi-fluid Clinometer, for showing the oscillation, pitching, and scending of ships, and also their trim.

Lent by the Rev. E. L. Berthon, Romsey, Hants.

228. Whole MODEL of the Cunard iron paddle steamer "SCOTIA," length 366 ft., beam 47 ft. 6 in., tonnage 4,050, builders' measurement, nominal horse power 1,000. Built 1861. Constructed for the British and North American Royal Mail Steam Packet Company by R. Napier & Sons.

Presented by R. Napier & Sons, Glasgow.

229. Whole MODEL of the Turkish iron armour-clad screw frigates "OSMANEA," "AZIZEA," and "ORKHANEA," length 293 ft., beam 36 ft., tonnage 4,222, builders' measurement, 42 guns, nominal horse power 900. Constructed for the Imperial Ottoman Government by R. Napier & Sons.

Presented by R. Napier & Sons, Glasgow.

230. MODEL of R. Napier & Sons' patent screw steering gear, as usually fitted by them to large ocean steam ships.

Presented by R. Napier & Sons, Glasgow.

231. MODEL showing section of a boat with two guns, and apparatus for working them, on Mr. Walker's plan.

Lent by Mr. J. Walker.

232. MODEL of a 3-gun battery, showing the working of the guns on Mr. Walker's plan. Lent by Mr. J. Walker.

233. MODEL of a floating battery of 3 guns, on Mr. J. Walker's plan. Lent by Mr. J. Walker.

234. MODEL of the section of a ship's side.

Lent by Mr. J. Walker.

235. MODEL of the section of a ship's side, with armour plates attached. Lent by Mr. J. Walker.

235a. MODELS of six Chinese boats, and one Chinese junk. Presented by Mr. J. Pybus.

236. MODEL of Captain Hurst's patent bulwark life raft, complete. Lent by Captain J. W. Hurst, M.M.

237. MODEL showing mode of fitting Hurst's patent bulwark life raft to waist-bulwarks of a ship. Lent by Captain J. W. Hurst, M.M.

238. MODEL of the Viceroy of Egypt's yacht, for the river Nile.
Presented by the Egyptian Commissioner for the Paris Exhibition of 1867.

239. MODEL of the American river steamer "EMPIRE," running between New York and Albany.
Presented by Mr. D. Lapraike.

240. Working MODEL of Clifford's patent boat-lowering apparatus. Lent by Mr. Charles Ralph.

241. Series of MODELS, 1 to 59.
Lent by Mr. Scott Russell, F.R.S.

These models illustrate the gradual developement of Mr. Scott Russell's wave-line system, and exhibit every intermediate step from the square box (No. 59) to the complete theoretical rendering of the idea in fig. 1.

The different models represent the experimental forms used for comparison; and the following are some of the most successful steamers and yachts which have been built upon the wave-line system.

3. The paddle-wheel steamer "BARON OSY," London and Antwerp trader.

5. A small screw steamer.

8. The Sydney and Melbourne Royal Mail Steam Packet Company's paddle steamer "PACIFIC," 1,470 tons, 500 horse-power.

12. A long collier.

13. A small screw steamer.

14. A paddle steamer of the "HALDER" class.

17. A lengthened screw collier of the "EAGLE" and "CAROLINE" class.

20. The Prussian man-of-war paddle steamer "DANTZIG," 12 guns, 400 horse-power.

21. The London, Brighton, and South Coast Railway Company's paddle steamer "ROUEN."

22. A screw steamer.

24. The paddle-wheel yacht "WAVE QUEEN."

- 34. The "UNDINE" yacht, belonging to the Duke of Sutherland.
- 35. The "THEMIS" yacht.
- 36. The "TITANIA" yacht.
- 42. Section of H.M.S. "WARRIOR," as originally designed by Mr. J. S. RUSSELL, F.R.S.

242. The contractor's MODEL actually used for the construction of the "GREAT EASTERN" steamship, showing size and fittings, &c., of the exterior iron plating.

Designed by Mr. I. K. Brunel, F.R.S.

Built by J. Scott Russell, F.R.S. This ship was designed in 1852, laid down in 1853, built 1857.

Lent by Mr. John Scott Russell, F.R.S.

243. The contractor's MODEL actually used for the construction of the "GREAT EASTERN" steamship, showing size and fittings, &c., of the interior iron plating.

Lent by Mr. John Scott Russell, F.R.S.

244. MODEL of the stern of the "GREAT EASTERN" steamship.

Lent by Mr. John Scott Russell, F.R.S.

245. MODEL of the schooner yacht "AMERICA," length 95 ft., beam 22 ft., tons 210. Built 1851.

Designed by Mr. Steers, New York.

Lent by Mr. John Scott Russell, F.R.S.

246. Figure head for a ship, full size.

Lent by Mr. R. Hall.

247. Balance rudder and arrangement of stern for twin screw steamships (iron built). Proposed by Mr. C. W. Merrifield, F.R.S.

Lent by Mr. C. W. Merrifield, F.R.S.

248. Arrangement and balance of weights of H.M.S. "PIQUE."

MODEL presented by Mr. John Edye, C.B., to Royal School of Naval Architecture.

Lent by the School.

249. Arrangement and balance of weights of one of H.M. steam ships.

MODEL presented by Mr. J. Edye, C.B., to Royal School of Naval Architecture.

Lent by the School.

250. A Pantameter, No. 1 size. For indicating the specific gravity of iron, wood, and coal, the sectional area of bars, and the cubic contents of any body that will go into the machine.

Lent by Mr. A. M. Bennett.

251. MODEL of 7-in. breech-loading "Armstrong" rifled gun, complete with sights and vent piece. Manufactured at the gun factory, Royal Arsenal, Woolwich.

252. Illustrations of guns and projectiles, as used in the Royal Navy, 1866. From Royal Arsenal, Woolwich.

1. WOOD MODEL of 7-inch muzzle loading wrought iron gun, rifled.
2. WOOD MODEL of 32-pounder gun.
3. WOOD MODEL of 13-inch. Sea service mortar.
4. 8-inch grummet wad.
5. 8-inch junk wad.
6. Two whole fuze metal caps.
7. Four sections of fuze metal caps.
8. Carcass, riveted teak.
9. Tin cup, for 7-inch breech-loading Armstrong gun.
10. Dyer's pattern metal percussion fuze, complete, for Armstrong gun.
11. Pillar's pattern metal percussion fuze, complete, for Armstrong gun.
12. Pettman's pattern metal percussion fuze, complete, for land service.
13. Pettman's pattern metal percussion fuze, complete, for sea service.
14. Armstrong pattern E, metal time fuze, complete.
15. Boxer's pattern metal time fuze, $7\frac{1}{2}$ seconds, complete.
16. Boxer's pattern metal time fuze, 20 seconds, complete.
17. Boxer's pattern 2-inch wood time fuze, for rifled ordnance.
18. Common pattern wood fuze, complete.
19. Diaphragm wood fuze, complete.
20. Hand grenade wood fuze, complete.
21. Large mortar wood fuze, complete.
22. Small mortar wood fuze, complete.
23. A section, empty, of Dyer's pattern Armstrong percussion fuze.
24. A section, empty, of Pillar's pattern Armstrong percussion fuze.
25. A section, empty, of Pettman's percussion fuze, for land service.
26. A section, empty, of Pettman's percussion fuze, for sea service.
27. A section, empty, of Armstrong pattern E. metal time fuze.
28. A section, empty, of Boxer's pattern $7\frac{1}{2}$ seconds metal time fuze.
29. A section, empty, of Boxer's pattern 20 seconds metal time fuze.
30. A section of Dyer's pattern Armstrong percussion fuze, filled for firing.
31. A section of Pillar's pattern Armstrong percussion fuze, filled for firing.

32. A section of Pettman's land service percussion fuze, filled for firing.

33. A section of Pettman's sea service percussion fuze, filled for firing.

34. A section of Armstrong pattern E metal time fuze, filled for firing.

35. A section of Boxer's pattern $7\frac{1}{2}$ seconds metal time fuze, filled for firing.

36. A section of Boxer's pattern 20 seconds metal time fuze, filled for firing.

37. A section of Boxer's 2-inch rifled ordnance wood time fuze, filled for firing.

38. A section of common wood time fuze, filled for firing.

39. A section of hand grenade wood fuze, filled for firing.

40. A section of diaphragm wood fuze, filled for firing.

41. A section of wood fuze for large mortar, filled for firing.

42. A section of wood fuze for small mortar, filled for firing.

43. A lubricator 7-inch breech loading service cartridge, complete.

44. A section of lubricator 7-inch breech-loading service cartridge.

45. Two large Armstrong shells, with string loops in shell.

46. A small Armstrong shell, with string loops in shell.

47. A common shell plug, in shells.

48. A diaphragm shrapnel shell plug, in shell.

49. A Martin shell plug, in shell.

50. A naval shell plug, in shell.

51. A 7-inch breech-loading hollow shot plug, in shot.

52. A 12-pounder Congreve rocket war shell, whole.

53. A section, filled, of 12-pounder Congreve rocket war shell.

54. A common Armstrong, 7-inch, breech-loading shell, empty.

55. A section, with plug, of a common Armstrong, 7-inch, breech-loading shell, empty.

56. Segment of Armstrong, 7-inch, breech-loading shell, section with loose segments empty.

57. Section segment of 7-inch breech-loading shell, with Boxer's time fuze, and adapter fitted.

58. Section of 12-pounder breech-loading shell, empty.

59. Section of 12-pounder breech-loading shell, with burster, and time percussion fuze.

60. Section of diaphragm shrapnel shell, with section of plug, empty.

61. Section of 8-inch or 68-pounder, riveted teak, diaphragm shell, filled, with section of fuze.

62. Section of 8-inch or 68-pounder, riveted teak, Martin shell, filled.

63. Section of 13-inch shell, for mortar, filled, with section of fuze.

- 64. Section of 8-inch or 68-pounder naval shell, riveted teak, and section of plug, empty.
- 65. Common 24-pounder shell, riveted, empty.
- 66. 8-inch, or 68-pounder, diaphragm shrapnel shell, riveted teak, empty.
- 67. Sea-service hand grenade shell, empty.
- 68. 8-inch, or 68-pounder, Martin shell, riveted teak, empty.
- 69. 150-pounder naval shell, riveted elm top, empty.
- 70. 8-inch, or 68-pounder, naval shell, riveted teak bottom, empty.
- 71. 13-inch mortar shell, filled.
- 72. 12-pounder, case, Howitzer shell.
- 73. Caffin's 8-inch, or 68-pounder, grape-shot shell.
- 74. Solid, loose, 68-pounder shot.
- 75. Solid, riveted, 12-pounder shot.
- 76. Armstrong, breech-loading, 64-pounder service shot.
- 77. Armstrong, breech-loading, 7-inch shot.
- 78. 12-pounder, service, Congreve rocket stick.
- 79. Friction copper tube.
- 80. Section of friction copper tube.
- 81. Quill friction tube, with loops.
- 82. Section of quill friction tube.

253. MODEL of a forecastle of a ship of war, fitted, showing pivots, racers, &c., to enable the guns and carriages to be shifted from one position to another for firing in any direction. From Royal Arsenal, Woolwich. 1867.

254. MODEL of a mortar bed, complete, showing the method adopted (1866) for fitting it to the deck of a ship of war so as to obtain an all round fire.

From Royal Arsenal, Woolwich. 1867.

255. Half MODEL of the Peninsular and Oriental Company's Screw Steamer "DELHI;" tons 1,898, horse power 400. Makers of the engines, Messrs. Ravenhill, Salkeld, and Company. Launched September 1863. Built by Messrs. Money, Wigram, and Sons.

Lent by the Peninsular and Oriental Steam Navigation Company.

256. Half MODEL of the Peninsular and Oriental Company's Screw Steamer "CHARKIEH." Tons 1,615, horse power 350. Makers of the engines, Messrs. J. and G. Rennie. Launched December 1864. Built by the Thames Iron Works Company, Limited.

Lent by the Peninsular and Oriental Steam Navigation Company.

257. Half MODEL of the Peninsular and Oriental Company's Screw Steamer "DAKAHLIEH." Tons 1,553, horse

power 350. Makers of the engines, Messrs. J. and G. Rennie. Launched February 1865. Built by Messrs. Money, Wigram, and Sons.

Lent by the Peninsular and Oriental Steam Navigation Company.

258. Half MODEL of the Peninsular and Oriental Company's Screw Steamer "TANJORE." Tons 1,971, horse power 400. Makers of the engines, Messrs. Ravenhill, Salkeld, and Company. Launched April 1865. Built by the Thames Iron Works Company, Limited.

Lent by the Peninsular and Oriental Steam Navigation Company.

259. Half MODEL of the Peninsular and Oriental Company's Screw Steamer "SURAT." Tons 2,578, horse power 500. Makers of the engines, Messrs. C. A. Day and Company. Launched March 1866. Built by Messrs. C. A. Day and Company, Southampton.

Lent by the Peninsular and Oriental Steam Navigation Company.

260. MODEL of the West India and Pacific Steam Shipping Company's screw steamer, "VENEZUELAN," tons 1,682, horse power, 220. Makers of the engines, Messrs. Jas. Jack and Company, Liverpool. Launched, 1865. Built by Messrs. Jones, Quiggin, and Company, Liverpool.

Lent by the West India and Pacific Steam Shipping Company.

261. MODEL of the West India and Pacific Steam Shipping Company's screw steamer, "BOLIVAR," tons 1,250, horse power 200. Maker of the engines, J. C. Thompson, Newcastle-on-Tyne. Launched, 1862. Built by Messrs. Richardson, Duck, and Company, Stockton-on-Tees.

Lent by the West India and Pacific Steam Shipping Company.

263. Cap worn by sailors on board the "INFERNAL" Bomb Ketch, commanded by the Hon. Capt. Perceval (Lord Egmont), at the siege of Algiers, in 1816.

Presented by Sir W. Trevelyan, Bart.

264. MODEL of 400 horse power engines, fitted to the screw steamer "A. LOPEZ," of the Spanish Mail Service. (Scale 3 inches to 1 foot.)

Lent by the makers Messrs. William Denny and Brothers, Dumbarton.

265. MODEL of a Cingalese outrigger canoe.

Lent by Mr. Thos. F. Dodd.

266. MODEL of the Trinity House steam yacht "GALATEA," tons 507 B.M., nominal horse power 200. Makers of the engines, Messrs. Laird and Co. Launched in 1867. Built by Messrs. Caird and Company, Greenock.

Lent by the Corporation of the Trinity House.

267. Set of telescopes formerly belonging to, and used by, Admiral Lord Nelson.

Lent by Mr. W. H. Maitland.

The set consists of, one 4 ft. glass; one day and night glass; one hand glass; two spare tubes, and an eye piece.

268. Half block MODEL of a Whitby five-man fishing boat. Length, 57 ft.; breadth, 17 ft.; depth, 8 ft. 4 in. Registered tonnage, 45 tons.

Lent by Mr. T. Turnbull, A.I.N.A.

269. Half block MODEL of a "COBLE" of the Yorkshire coast. Each five-man fishing boat carries two cobbles. The flat after end allows them to be easily beached. When under sail a rudder projecting 4 ft. below the stern is used.

Lent by Mr. T. Turnbull, A.I.N.A.

270. Whole MODEL of the City of Dublin Steam Packet Company's Mail Steamer "CONNAUGHT," running between Kingstown and Holyhead. Length, 348 ft.; width, 35 ft.; depth, 20 ft. 3 in.; tonnage, 2,039; nominal horse-power, 720; diameter of cylinders, 98 inches; length of stroke, 6 ft. 6 in.; speed, 21 statute miles per hour. Makers of the engines, which are on the oscillating principle, Messrs. Ravenhill, Salkeld, and Co., London. The ship was designed and built by Messrs. John Laird, Sons, and Co., Birkenhead, and launched in 1860.

Lent by Messrs. Laird Brothers, Birkenhead.

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TO THE

CATALOGUE AND ITS APPENDIX

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MUSEUM OF NAVAL MODELS.

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